MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

5TH STEM EDUCATION INTERNATIONAL VIRTUAL CONFERENCE (STEMEIC2024)

[BOOK OF ABSTRACTS AND PROGRAMME]

WEDNESDAY 13TH TO FRIDAY 15TH NOVEMBER 2024

THEME

"Leveraging STEM Innovations for inclusive Societal Advancement and Sustainable Development"

CONFERENCE ORGANISING COMMITTEE

1. Prof. Catherine Aurah - Conference Chair
2. Prof. Kennedy Bota - Conference Co-Chair
3. Prof. Peter Bukhala
4. Prof. Francis Orata
5. Dr. Rose Opiyo
6. Dr. Edwin Kanda
7. Dr. Teresa Okoth
8. Dr. Lydia Anyonje
9. Dr. Benard Mudogo
10. Dr. David Barasa
11. Dr. Fridah Njeru
12. Dr. Robert Kati
13. Dr. Rose Mutende
14. Dr. Adedamola Kareem
15. Mr. Elvis Jonyo
16. Mr. Morgan Musiambo
17. Mr. Erick Wendo
18. Ms. Purity Muchere

REMARKS BY THE PRIME CABINET SECRETARY, H.E MUSALIA MUDAVADI

H.E Musalia Mudavadi
Prime Cabinet Secretary

It is a great honour to join the great minds gathered here today as Masinde Muliro University of Science and Technology marks the 2024 STEMEIC Conference. This forum embodies the spirit of innovation and collaboration in the fields of Science, Technology, Engineering, Mathematics, and Entrepreneurship. This year's theme, '***Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development***,' attests to our shared commitment to building a better future for all.

I take this opportunity to applaud the University leadership, spearheaded by the Chairperson of Council-Dr. Pamela Sitienei, for investing in STEM initiatives, such as this Conference, that create pathways for under-represented voices to contribute to our collective advancement. By fostering diversity in our STEM fields, we unlock perspectives and ideas that drive innovation and creativity.

As a government, sustainable development is at the core of our business, and STEM innovations are the conduits to achieve it. From renewable energy technologies to

sustainable agricultural practices, the potential for STEM to address environmental challenges is immense. We must prioritize research and development in these areas and invest in solutions that not only drive economic growth but also protect our future generations.

As we engage in discussions throughout this Conference, let us keep our focus on how we can use STEM innovations not just to advance technology, but to transform our livelihoods and ensure sustainability of the future generations. I have no doubt that when we come together, we can create a legacy of inclusivity, development and sustainability for Kenya.

Thank you MMUST for your dedication towards this noble course!

H.E Musalia Mudavadi,
Prime Cabinet Secretary, Republic of Kenya.

WELCOMING REMARKS BY THE CHIEF GUEST

Hon. Julius Migosi Ogamba, EBS
Cabinet Secretary for Education

I am honored to join you at this year's STEM Education International Conference, where we gather to deliberate on a theme that could not be more timely: '*Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development.'* This theme reminds us that innovation is crucial and therefore we must harness the potential of STEM, to ensure that all members of our society, across gender, geography, and socio-economic divides, have access to these advancements. This will ensure we grow as a nation and sustainably, leaving no one behind.

I assure you that the Ministry is working hard to break down the barriers that have traditionally hindered participation in STEM, especially for girls and marginalized communities. Through targeted initiatives, we are increasing access to STEM education for all. The government is actively seeking partnerships with industry, academia, and international organizations in order to be at the forefront of STEM innovation.

The Ministry has also prioritized financing of STEM research and innovation. We are increasing grants for students pursuing careers in STEM especially those focusing on sustainable development. I believe that as we fund research, we are empowering the next generation of scientists, engineers, and innovators to create technologies and solutions that will address the challenges that we face as a society.

Hon. Julius Migosi Ogamba, EBS
Cabinet Secretary, Ministry of Education

MESSAGE FROM THE PRINCIPAL SECRETARY, STATE DEPARTMENT FOR HIGHER AND RESEARCH

Dr. Beatrice Muganda Inyangala
Principal Secretary,
State Department of University Education and Research

I am delighted to be among the scholars and researchers, who have convened here today from across the globe to mark the Masinde Muliro University of Science and Technology 5th STEM Education International Conference. The State Department for Higher Education and Research has continuously championed access to education in Kenya, specifically at the University level.

It is important to note that the Ministry of Education has not only laid great emphasis on quality education and training, but also supported STEM education for sustainable development. I would like to take this opportunity to urge all stakeholders to join us in this endeavour. Further I call upon national and international investors to partner with us in acquiring facilities and resources that will enhance the teaching and training of STEM in this country.

MMUST has done a commendable job in providing platforms for stakeholders to engage in discussions that will lead to positive outcomes not only in Kenya, but also the entire continent. I am very pleased with the organizers of this annual event, the University Management, as well as all the participants that have made this Conference a success. I

assure you that the State Department for Higher Education and Research is in support of this activity, and I am eager to learn from the experts represented in this Conference.

I wish you a successful and fruitful Conference!

Dr. Beatrice Muganda Inyangala,
Principal Secretary, State Department of University Education and Research

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MESSAGE FROM THE CHAIR OF COUNCIL

Dr. Pamela Sitienei
Chairperson of Council, MMUST

I am delighted that Masinde Muliro University of Science and Technology (MMUST) is hosting the STEMEIC2024 International Conference this year. As the Chairperson of Council, it is my pleasure to invite all of you to this important event. I thank all distinguished guests attending this conference for taking time away from their busy schedules to grace this educational event.

This Conference, themed '***Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development***', could not be more timely, especially in this era that has been revolutionized with the advent of Artificial Intelligence (AI). There is, therefore, an urgent need for institutions, particularly those of higher learning, to address and embrace this change, and see how best they can maximize on it to enhance the quality of teaching and learning.

I am glad to inform you that the MMUST Council has set in motion processes and procedures to engineer the way teaching and learning is conducted in this University. Enhancing innovation and technology is also a big part of this agenda. As a student-centred University, we are determined to ensure that students experience a conducive learning environment, while staff get the necessary support and resources to enable high quality education for our students.

In response to Kenya's new funding model, MMUST is determined to seek alternative income streams to facilitate its operations and lessen dependence on Government's

budgetary allocations. Let us continue to utilize research as an avenue of raising funds to support teaching, learning and outreach. The MMUST Council is ready to support researchers who are willing to conduct cutting-edge research and innovation that will attract funding. Council is truly committed to this fundraising endeavour.

I look forward to many more such conferences which will earn MMUST accolades as the University known for harnessing research, technology and innovation in STEM.

I wish you productive deliberations.

Dr. Pamela Sitienei
Chairperson of Council, MMUST

MESSAGE FROM THE VICE CHANCELLOR

Prof. Solomon I. Shibairo
Vice Chancellor, MMUST

It is an honour and a privilege to welcome you to this year's STEMEIC 2024 Conference, themed '***Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development'.*** Thank you very much for accepting to grace this occasion. I thank all our key note speakers, our guest speakers and all participants present here today. I recognize the efforts of the Division of Research, Planning and Innovation, as well as the conference organizing committee for working hard to ensure we have the 5th STEM Education International Conference hosted at MMUST. As a University that prioritizes matters of research, innovation and community outreach, we appreciate the support we have continued to receive from the MMUST Council and the Ministry of Education.

At Masinde Muliro University of Science and Technology (MMUST), we believe that the integration of Science, Technology, Engineering, and Mathematics is not just a pathway to academic achievement but a fundamental driver of societal progress. In an era where challenges such as climate change, healthcare disparities, and technological inequities threaten our communities, it is imperative we harness the power of STEM innovations to create inclusive solutions that benefit all members of society.

As we engage in discussions over the next few days and interact with research outputs by staff and students, I encourage each of you to think critically about how we can leverage our collective expertise to foster cutting-edge innovation that is accessible to all. Let us challenge ourselves to think beyond traditional boundaries and explore interdisciplinary approaches that can yield transformative results.

I wish you all a happy and successful conference.

May God bless us all.

Prof. Solomon Shibairo
Vice Chancellor, MMUST

REMARKS BY THE
DEPUTY VICE CHANCELLOR, PLANNING RESEARCH AND INNOVATION

Prof. Charles Mutai
DVC, Planning, Research and Innovation

I am delighted to welcome you to this pivotal conference on **Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development.** Our gathering today is not just about academic inquiry; it focuses on shaping a future where research and innovation lead to tangible societal impact. This event emphasizes the crucial role of STEM in addressing pressing challenges such as climate change, technological inequality, and social disparities while promoting inclusivity, sustainability, and equity in education.

At the **Division of Planning, Research, and Innovation**, we are committed to creating an environment where innovative ideas transform into actionable solutions. This conference reflects our dedication to ensuring that advancements in STEM are both ground-breaking and accessible to all. The integration of AI, digital technologies, and interdisciplinary approaches offers new perspectives on STEM education, particularly within the **Competency-Based Curriculum (CBC)** and its STEM pathways. This curriculum emphasizes a learner-centred approach, equipping students with essential skills in problem-solving, critical thinking, and creativity.

As we engage in discussions over the coming days, I encourage each of you to collaborate, share insights, and build partnerships that will advance both education and societal transformation. Together, we can pave the way for a sustainable and equitable future—one where STEM leads the charge in resolving global issues and empowers all members of society. Let this conference serve as a catalyst for bold ideas and ground-breaking research that will shape the future of STEM and its impact on our world.

Thank you

Prof. Charles Mutai
Deputy Vice-Chancellor (Planning, Research and Innovation)

MESSAGE FROM THE DIRECTOR, RESEARCH AND POSTGRADUATE SUPPORT

Prof. Francis Orata Omoto
Director, Research and Postgraduate Support

Welcome to the blended 5th STEM Education International Conference (STEMEIC 2024), that is proudly hosted by Masinde Muliro University of Science and Technology (MMUST). The theme, ***"Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development"*** encapsulates the government's Bottom-Up Economic Transformation **Agenda** (BETA) 2022-2027 initiative, meant to uplift the livelihoods of Kenyans. Looking at the Conference Subthemes, that emphasize more on sustainability aspect of our research, the subthemes are well in line with the 17 **Sustainable Development Goals** adopted by the General Assembly of the United Nations

As the Director of Research and Postgraduate Support at MMUST, it is my pleasure to express our commitment to supporting this vital conference. Research is the cornerstone of innovation, and our division is dedicated to fostering research driven innovative ideas and scholarly pursuits. We understand the pivotal role research plays in advancing development and uplifting livelihoods.

During the conference, our directorate will actively contribute by facilitating discussions on cutting-edge research findings, sharing insights into postgraduate support structures, and fostering collaborations to drive innovation in Science, Technology, Robotics,

Engineering, Arts and Mathematics (STREAM). Through collaborative efforts, let us explore and embrace the innovations that will propel sustainable development. Our directorate activities can be found at https://research.mmust.ac.ke/

Thank you for accepting participation in the 5th STEM Education International Conference (STEMEIC 2024), and we eagerly anticipate a conference filled with insightful deliberations and meaningful contributions to the future of Research in Science, Technology and Innovation for Sustainable Development.

Prof. Francis Orata Omoto
Director Research and Postgraduate Support

REMARKS BY THE
DEAN, SCHOOL OF EDUCATION

Prof. Moses Poipoi
Dean, School of Education (Hosting School)

It is my pleasure to welcome you to this significant conference on "**Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development.**" This gathering provides a remarkable platform to explore how we can revolutionize STEM education to tackle today's and tomorrow's challenges.

We will delve into integrating sustainability principles into our curricula, equipping learners with the skills to address environmental issues and promote a greener future. Emerging technologies particularly AI, present exciting opportunities to enhance learning, ensuring equitable access for all students.

Fostering diversity, equity, and inclusion remains a priority as we work to reduce gender disparities and support underrepresented groups in STEM fields. We will also examine how STEM education can adapt to emergency contexts, ensuring that learners in fragile settings have the necessary resources to thrive.

Of importance, the conference delves into the interdisciplinary nature of STEM, integrating creative arts, languages, and social sciences to enhance critical thinking and problem-

solving skills. By embracing these fields, we can create inclusive learning environments that reflect our students' cultural diversity.

This conference aligns with our mission in the School of Education to foster innovative, inclusive practices. Together, we can shape the next generation of STEM leaders—ethical, socially conscious individuals driving sustainable societal advancement.

I look forward to the invaluable insights and impactful outcomes that will emerge from our discussions. Thank you for your participation.

REMARKS BY THE STEMEIC2024 CHAIRPERSON

Prof. Catherine M. Aurah
Associate Professor, Department of Science and Mathematics Education, STEMEIC2024 Chairperson

It is a profound honour to welcome you to the fifth annual conference on **Leveraging STEM Innovations for Inclusive Societal Advancement and Sustainable Development.** As we gather today, we stand at the intersection of innovation and education, where our discussions can shape the future. This year's theme is particularly crucial as it underscores the power of STEM—and the integration of AI—to address pressing global challenges.

Our objectives include fostering dialogue on global challenges, bridging STEM advancements with community needs, promoting interdisciplinary collaboration, and exploring AI's transformative role in education and research.

We will delve into integrating sustainability into curricula, enhancing technology access, promoting diversity, and adapting STEM education in crisis settings. The focus on the future of work highlights the importance of interdisciplinary approaches in preparing students for tomorrow's job market. Additionally, discussions will cover AI's potential and ethical considerations in STEM pedagogy, alongside enhancing linguistic proficiency for effective communication in STEM subjects and fields.

Together, we will explore how to weave sustainability, equity, and resilience into the fabric of our educational practices, ensuring that no student is left behind. Let's ignite transformative discussions that will empower future generations to lead with creativity, compassion, and conviction in the STEM fields.

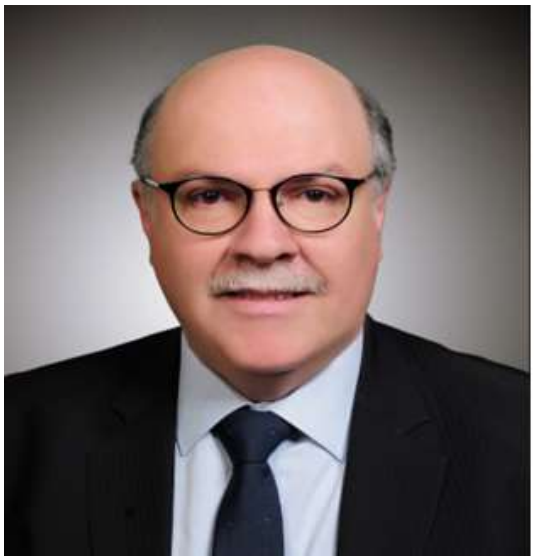
I encourage you to engage fully in the sessions ahead and collaborate to harness STEM innovations for a more just and inclusive world.

Feel most welcome to STEMEIC2024

Prof. Catherine Aurah

Conference Chair/Associate Professor, Science Education

STEMEIC2024 KEYNOTE/GUEST SPEAKERS



Prof. Dr. Mustafa Hilmi Colakoglu
mustafacolakoglu@nevsehir.edu.tr
Vice rector Nevsehir Hai Bektas,Veli University , Turkey

TOPIC: AI in Education: Transforming Learning and Teaching in Kenya and Beyond

Born in Ankara in 1957. He is a Mechanical Engineer where he graduated from Middle East Technical University. He got his M.Sc. degree from Department of Industrial Engineering of Hacettepe University and Ph.D. degree from the GAZİ University Faculty of Technical Education. He became associate professor in 2011. As Vice President and acting president of KOSGEB, he realized the establishment of more than 20 Technology Incubation Centers. He is the advisor to Technology Development Foundation of Turkey and Ayvansaray University. He lectured at METU, TOBB ETÜ, KASTAMONU and ERCIYES Universities. He is the delegate of Turkey to OECD PISA, PIAAC, ECEC, curriculum content mapping, ET2030 programs and activities. He was the managing board member of VQA-Turkey Vocational Qualification Accreditation Body, president of Turkey Qualification Council and the member of Higher Education Quality Council on 2016 to 2017. He is the partner and/or consultant on many FP7, H2020, and ERASMUS+ projects.

He was the Deputy Undersecretary of Ministry of National Education of Turkey on 2014-2017, responsible from the strategic management, ICT management and financial management of education and training.

He is the founder of the Mindmapping Association and the Journal of Continuous Vocational Education and Training.

He is already the advisor to Minister of MoNE and the deputy chancellor of Nevşehir Hacı Bektaş Veli University.

Maina A. B. Gioko PhD
gioko@agakhanacademies.org

TOPIC: Advancing Technology and Equitable Access in STEM Education

Dr. Anthony M. B. Gioko is a visionary educator, researcher, and technology integration expert committed to advancing equitable access to STEM education and transforming educational systems across Africa. With a Master's degree from Aga Khan University, Karachi, specializing in ICT integration in science education, Dr. Gioko has devoted his career to pioneering technology-driven, inclusive pedagogies that reshape learning experiences for diverse communities.

Dr. Gioko leads two landmark projects—*Foundation for Learning (F4L)* and *Knowledge Innovation Exchange (KIX)* — dedicated to enhancing learning outcomes through inclusive, tech-enabled education models. As Project Director of F4L, a five-year initiative focused on premiering distance learning methods across East Africa, Dr. Gioko explores sustainable approaches to professional development, providing educators with accessible, high-quality learning opportunities across the region.

His research has driven impactful initiatives, including the *ABRACADABRA Early Literacy Software* project in Kenya, with global recognition for his work in ICT-enhanced pedagogy. He has presented his findings at prestigious forums such as the International Federation for Information Processing (IFIP) World Conference and the Comparative and International Education Society Conference.

In addition to his academic work, Dr. Gioko serves as a Board Member of Global Action Plan International, advocating for Education for Sustainable Development, and as Board Chair of The Action Foundation, where he champions inclusive technology integration, focusing on advancing STEM education for girls. His accolades, including a Microsoft Fellowship for education innovation and a Harvard Graduate School of Education Fellowship, highlight his enduring commitment to impactful educational transformation.

Through his leadership in professional learning communities and curriculum development, Dr. Gioko continues to inspire advancements in STEM education across Kenya, East Africa, and beyond.

Andrey V. Koptelov, Ph.D
Associate Professor
School of Teaching and Learning, College of Education
Sam Houston State University
axk022@shsu.edu

TOPIC: Integrating AI in STEM Pedagogy: Transforming Education for the Future

Dr. Andrey V. Koptelov is an Associate Professor in the College of Education at Sam Houston State University. He is the Director of the Center for International Education at the College of Education at Sam Houston State University. Dr. Koptelov moved to Houston in 2001 where he taught Technology Applications at Fonville Middle School in Houston ISD. This school serves under-represented communities including a large number of migrants. In 2010 he started designing and developing educational computer games focused on STEM with his middle school ESL and EFL students. In 2011, the National Science Foundation of America (NSF) awarded one of his projects and it was presented in Washington, D.C., at the NSF GK-12 Annual Conference. In 2011. Dr. Koptelov's students had the highest scores on the Technology Literacy Assessment in Houston ISD among the 59 campuses that were tested. In the fall of 2012, Dr. Koptelov became an Assistant Professor at Sam Houston State University in Huntsville, Texas, USA. His research interests center on integrating technology in teaching and learning. Dr. Koptelov has published extensively and presented at numerous international, national, and state conferences. He has more than 70 publications in Europe and the USA. Dr. Koptelov has more than 15 years of teaching experience in K-12 and more than 20 years of teaching in higher education. Dr. Koptelov collaborates with teachers, schools, and other universities nationally and internationally in matters of integrating modern technologies in education.

He collaborates with educators from Costa Rica, Kenya, Belarus, Armenia, Japan, China, Thailand, Korea, Ireland, Australia, and other countries.

Dr. Benson Kituku
benson.kituku@dkut.ac.ke

TOPIC: Transforming STEM teaching and Learning by integrating generative Artificial intelligence

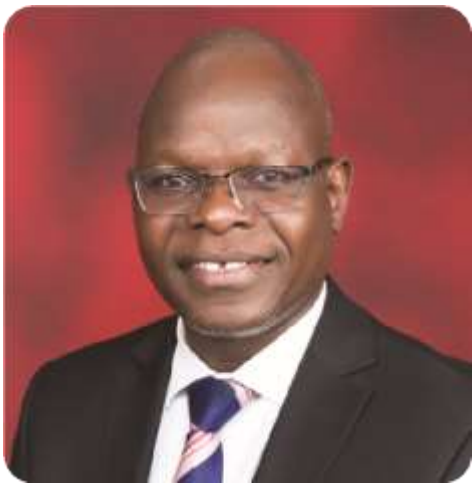
Dr. Kituku is a Computer Scientist plus an evangelist of artificial intelligence in the classroom and has interests in Machine Learning and Natural Language Processing, with a specialized focus on African languages. Furthermore, he has a deep interest in educational technology. His current research explores the use of generative artificial intelligence to support active learning and creativity in STEM courses. Dr. Kituku is dedicated to transforming STEM teaching and learning by integrating advanced AI technologies, aiming to enhance student engagement and educational outcomes.

Dr. David Muchangi Mugo

david.mugo@embuni.ac.ke

TOPIC: Generative Artificial Intelligence on Higher Education in Kenya

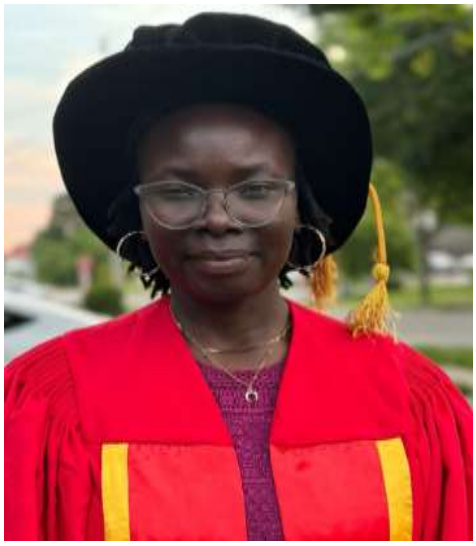
Dr. Mugo holds a PhD in Information Systems from Kenyatta University, Kenya, an MSc in Computer Science from the Technical University of Hamburg, and an MBA in Technology Management from the Northern Institute of Technology Management, Hamburg. He graduated with first-class honours in Computer Science from Kenyatta University and has published over 20 journal papers on Information Systems, Artificial Intelligence, and Computer Science. Dr. Mugo is a Senior Lecturer and Chairman of the Department of Computing and Information Technology at the University of Embu, Kenya, where he has also coordinated the university's Webometrics ranking efforts. He is an external examiner at Murang'a University of Technology, previously serving at St. Paul's University and Zetech University. Professionally, he is a Knowledge Management Consultant, certified IBM Big Data Engineer, Cloud Developer, AI Analyst, and ISO 9001:2016 and ISO 27001:2013 auditor. With 13 years of teaching experience, he has also secured research grants from organizations like Belmont Forum and OWSD. Dr. Mugo is actively involved in community empowerment as chairman or vice-chairman for several secondary schools and St. Ann Catholic Church Kamiu. He frequently speaks at schools to inspire future leaders and is a father of three.



Professor Vincent O. Onywera
KCA University, Kenya
vonywera@kcau.ac.ke

Topic: **THE NEED FOR SCIENCE, TECHNOLOGY AND INNOVATION IN PROMOTING SUSTAINABLE SPORTS EXCELLENCE IN KENYA**

Professor Vincent O. Onywera is the Pioneer Deputy Vice Chancellor Research, Innovation and Outreach at KCA University, Kenya. He is a Professor of Physical Education, Exercise and Sports Science with over twenty-five (25) years of teaching and research experience, fifteen (15) of which he has served at senior level in University Leadership and Management. He holds a PhD (Exercise and Sports Science) where his research focus was on the role of genetics, nutrition and sociocultural factors in explaining the phenomenon performance of Kenyan middle and distance runners. He is a Physical Activity and Active Transport Researcher with extensive national and international research networks. Vincent has worked as the Director of the Center for International Programmes and Collaboration at Kenyatta University. Vincent has published close to 200 publications comprising articles in refereed journals, books, book chapters, conference proceedings, and conference abstracts. He has competitively secured over Kshs. 600,000,000 worth of research and development grants from various international funding agencies. Vincent is involved in a number of national, regional and international academic endeavors aimed at capacity building, surveillance and research focusing on healthy active living in the greater Eastern Africa and Great Lakes Region He has a citation index of 9729, h-index of 53 and i10-index of 96.



Amb. Dr. Christine Obaigwa Owinyi

TOPIC: *Harnessing AI-Driven Research and Development for Advancing STEM Education and Sustainable Solutions*

Ambassador Dr. Christine K. Obaigwa Owinyi is a prominent leader, educator, and advocate for sustainable development and global citizenship. With a rich background in education management, she has significantly impacted communities worldwide. Dr. Owinyi is the CEO and Co-founder of the Kenya Canadian Empowerment Network (KCEN), Group CEO of the Global Alliance for Sustainability in Education (GASE), and Global Coordinator for Leaders of All Nations International (LOANI). Her academic journey includes a Ph.D. in Education Management and Policy Studies from Masinde Muliro University of Science and Technology (MMUST), along with Master's and Bachelor's degrees in Education from Egerton University. Currently, she is pursuing postgraduate studies in Project and Human Resources Management in Canada.

Dr. Owinyi has spearheaded numerous projects in sustainable development, menstrual health advocacy, and environmental stewardship. Her contributions have earned her global recognition, including the Global Humanitarian Award and the Visionary Woman Award. As an author and content creator, she has published over 170 educational videos and several books, including her latest work, *Embracing the Future: Artificial Intelligence in Education for All*.

With a vision of advancing sustainable education, Dr. Owinyi continues to champion global partnerships, accessible education, and community empowerment, inspiring others through her leadership and public speaking.

Danise Engle Sam

Houston State University Doctoral Student, Associate Editor

Topic: Artificial Intelligence in Education (AIEd) Tools (AI and ChatGPT): Exploration of various AIEd tools and technologies that are shaping modern education

After teaching elementary and middle grades, I ventured back into the student role as a doctoral student at Sam Houston State University's curriculum and instruction program. Continuous outreach and improvement is what I strive for, keeping up-to-date in current literature and sharing my findings through various platforms. This academic journey has lead me to the pursuit of aiding in the cultivation of stable diffusion in the field of education with hopes of this culture pollinating to the workforce and societal norms.

Prof. Barbara Moser-Mercer

Topic: **Integrative Social-Emotional-Learning for forced displacement contexts**

Barbara Moser-Mercer, Professor Emerita and founder of InZone at the University of Geneva, is dedicated to advancing Higher Education in Emergencies (HEiE) through African-led solutions. She has been leading the launch of the African Higher Education in Emergencies Network (AHEEN) and is a Visiting Fellow at Oxford's Refugee Studies Center. With a background in conference interpreting and cognitive psychology, she has researched expertise development in bilinguals, using these insights to design multilingual, student-centered digital learning and social-emotional programs for fragile settings. Her work builds bridges between humanitarian and academic sectors, expanding educational opportunities for displaced youth that benefit students and their communities, and shaping education policies in refugee-hosting nations. She has contributed to multiple INEE working groups, including co-chairing Standards and Practice, PSS-SEL, DEWG, and the MS Update Reference Group.

Dr. Cecilia Wandiga

TOPIC: *Women at the Nexus of EcoChemistry and Sustainable Urban Construction: Bridging STEAM with Society for Holistic Sustainable Solutions*

Cecilia Wandiga is Executive Director and Trustee Board Member for the Centre for Science and Technology Innovations (CSTI). Founded in 1998 as a UNESCO Associated Trust, CSTI serves as a research and development hub and think tank focused on applied sustainable chemistry in industrial ecology. Ms. Wandiga promotes empowerment in technology fields through her mentorship of professional women in the sustainability sector. She is an Assistant Lecturer, University of Nairobi, and Department of Sociology - African Women's Entrepreneurship concentration. Additional leadership roles include Director of the Natural Resource Forum (NAREF), a KEPSA BMO; Chair of the NAREF Research, Education, and Technology working group; Director of the African CSOs Biodiversity Alliance (ACBA).

Mrs. Jacinta Akatsa

The Director
CENTRE FOR MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION IN AFRICA (CEMASTEA)
www.cemastea.ac.ke

TOPIC: *Coding in STEM: Inspire, Imagine, and innovate*

Mrs. Jacinta Akatsa, HSC, is one of Kenya's premiere educators for over 30 years now, currently serving as the Director at the Centre for Mathematics, Science and Technology Education in Africa where she provides strategic leadership at the Centre as a Pan African institution whose mandate is to provide continuous professional development of teachers in STEM education. Mrs. Jacinta Akatsa holds an MBA from Jomo Kenyatta University of Agriculture and Technology and a Bachelor's in Education (Science) from the Catholic University of Eastern Africa. She has taught and led at prominent schools like Precious Blood and Maryhill Girls' National School, advancing to Chief Principal. An author of Biology course books with Longhorn Publishers, she now serves as CEO at CEMASTEA, providing strategic leadership in STEM teacher development across Africa. She is also the Executive Secretary of SMASE-Africa, promoting policies in math and science education on the continent. Mrs. Akatsa is dedicated to enhancing teacher capacity and quality education.

FRIENDS SCHOOL KAIMOSI GIRLS, VIHIGA KENYA

BUDDING STEM SCHOLARS

TOPIC: EXPLORING BIOLOGY THROUGH STEM MODELS

Authors:Betty Karimi[a],Susan Muhonja[a],Terry Chitechi[a],,Prudence Buyanzi[a], Prudence Buheri[a],Noel Omuronji[a],Noeler Amisi[a],Gracia Wangia[a],Opra Neru[a]*

The project titled "**Exploring Biology Through STEM Models**" aims to enhance students' understanding of biological concepts by integrating principles of Science, Technology, Engineering, and Mathematics (STEM) into hands-on learning experiences. Targeting middle to high school students, this project involves students creating both physical and digital models to represent key biological topics such as cell structure, genetics, human anatomy, and ecosystems.

CONFERENCE PROGRAMME

DAY ONE: WEDNESDAY, 13TH NOVEMBER 2024

7.00-7.30AM	Log-in and Registration	Secretariat
	OFFICIAL OPENING OF THE CONFERENCE	
7.30-7.35AM	**WELCOMING REMARKS** **Prof. Catherine Aurah -**Chair STEMEIC 2024 **Prof. Francis Orata- Director Research**	Prof. Catherine Aurah
7.35-7.45AM	**Prof. Charles Mutai –** Deputy Vice Chancellor (Planning, Research, and Innovation)	Prof. Francis Orata
	Prof. Hussein S. A. Golicha – Deputy Vice Chancellor (Academics & Students Affairs)	Prof. C. Mutai - DVC (PRI)
	Prof. John Kuria Thuo – Deputy Vice Chancellor (Administration & Finance)	
7.45-7.50AM	**OPENING REMARKS** **Prof. Solomon Shibairo**- Vice Chancellor, MMUST	Prof. C. Mutai - DVC (PRI)
7.50-7.55AM	**Dr. Pamela Sitienei**- Chairperson of Council, MMUST	Prof. Solomon Shibairo
7.55-8.05AM	**Dr. Beatrice Muganda Inyangala-**Principal Secretary, State Department of University Education and Research	Dr. Pamela Sitienei
8.05-8.35AM	**Hon. Julius Migosi Ogamba -** Cabinet Secretary, Ministry of Education	Dr. Beatrice Muganda Inyangala
8.35-8.55AM	**H.E Musalia Mudavadi -** Prime Cabinet Secretary	Hon. Julius Migosi Ogamba
PLENARY SESSION 1 **Moderator:** *Dr. Teresa Okoth*		**Rapporteur:** *Ms. Monica Odero*

8.55-9.35AM	Prof. Mustafa Hilmi Colakoglu ***Topic: AI in Education: Transforming Learning and Teaching in Kenya and Beyond***
9.35 – 9.55 AM	Q&A
9.55-10.00AM	**Group Virtual Photo/Break - DCCM**

PRESENTATION SESSION 1 **Breakaway Room1: VC's Boardroom**	
Sub-theme 8: Integrating AI in STEM Pedagogy: Transforming Education for the Future	
Moderator: *Dr. Teresa Okoth*	**Rapporteur:** *Ms. Monica Odero*
10.00-10.20AM	***Isaac Macheso, Robert Kati:*** Extent of Multimedia Instructional Resources Utilization in Teaching Science and Technology in Grade 6 in Western Kenya
10.20-10.40AM	***Theogene Niyomufasha, Celestin Ntivuguruzwa, Leon Mugabo:*** Examining the Impact of the Investigated-Based Multiple Representation (IBMR) Learning Model on Mechanics Problem-Solving among Engineering Students at a Selected Public Higher Education College in Rwanda
10.40-11.00 AM	***Alphayo Ocholla, Catherine Aurah, Raphael Ongunya:*** Improving Accuracy Level in Measurements of Current and Voltage by use of Electronics Practical Workbench in Physics High School Physics Practical Work
11.00-11.20AM	***Emmanuel BYIRINGIRO:*** Effect Of Class Size On The Academic Performance Of Students In Mathematics Subject In Rulindo District At E.S. Rukozo, Rwanda
11.20-11.40AM	***Ezechiel Nsabayezu, Olivier Habimana, Wenceslas Nzabalirwa, Francois Niyongabo Niyonzima:*** Exploring the barriers to effective implementation of multimedia-supported flipped classroom approach in organic chemistry in selected secondary schools of Rwanda

PLENARY SESSION 2 **Moderator:** *Dr. Teresa Okoth* **Rapporteur:** *Ms. Ms. Monica Odero*	
11.40-12.20 PM	Prof. Barbara Moser-Mercer ***Topic:*** **Integrative Social-Emotional-Learning for forced displacement contexts**
12.20 – 12.40 PM	Q&A
PRESENTATION SESSION 2 **Breakaway Room1: ABA415** **Moderator:** *Dr. Fridah Njeru* **Rapporteur:** *Ms. Linet Anyango*	
Sub-theme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions Subtheme 9: **Harnessing AI-Driven Approaches within CBC Pathways to Elevate STEM Education**	
10.00-10.20AM	*Aloys Iyamuremye, Innocent Twagilimana, Francois Niyongabo Niyonzima:* Exploring the opportunities and challenges of using web-based discussions tools in teaching organic chemistry in Rwandan secondary schools
10.20-10.40AM	***Hellen Okonji Okonji, Okaya Khasakhala:*** Use of ICT in Implementation of Competency Based curriculum in Kenya
10.40-11.00AM	*Mervyn Odeo:* Leveraging AI-Enhanced Pedagogies to Strengthen STEM Education in Kenya's Competency-Based Curriculum
11.20-11.40AM	*Okaya Khasakhala, Hellen Okonji Okonji:* Use of ICT in Implementation of Competency Based curriculum in Kenya
	PRESENTATION SESSION 3 **Breakaway Room1: VC's Boardroom** ***Sub-theme 7:*** Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions ***Moderator: Prof. Catherine Aurah*** ***Rapporteur: Erick Wendo***

12.40-1.00 PM	***John Wenje Nyongesa, Robert Kati:*** Parental Role in Assisting Pupils Acquire Entrepreneurial Skills
12.40-1.00 PM	***Juliana Andisi, Peter Bukhala, Roselyne Odiango:*** Psycho-social determinants of female participation in sports aming trainees in teacher training colleges in Kenya
1.00-1.20PM	***Roselyne Odiango[1]. Gordon Nguka[2]. & Edinah Sabiri Mogaka[3].*** Covid-19 awareness, physical activity levels and balanced Dietary Intake Among adolescent with Disability in Kakamega County, Kenya.
1.20-1.40PM	***Elizabeth Sisianoi K,Silvenus Konyole, Gordon Nguka:*** Stakeholders' Characteristics Influencing the Implementation of Food Security Projects in Vihiga County, Kenya
1.40-2.00PM	***Nelly Kiplagat:*** Factors Influencing Nurse Interns' Competence in Physical Assessment for Adult Patients
2.00-2.20PM	***Okumu, L.M., Wakhungu J. W., Ndiema A.C., Okoth A.W:*** Factors influencing the use of mobile phone enabled services for accessing agricultural information by smallholder farmers in Bungoma County, Kenya.
	PRESENTATION SESSION 4 **Breakaway Room2: ABA415** **Moderator: Dr. Bernard Mudogo** **Rapporteur:** *Ms. Linet Anyango* *Subtheme 9:* **Harnessing AI-Driven Approaches within CBC Pathways to Elevate STEM Education**
12.40-1.00PM	***Issa Ndungo, Sudi Balimuttajjo, Edwin Akugizibwe:*** A Qualitative Investigation on Learners Experiences and Understanding of Transformation Geometry with Van Hiele Phased Instruction and Technology-Enhanced Van Hiele Phased Instruction
1.00-1.20PM	***Benard Nyasimi:*** Assessment of Utilisation of Computer Technology Tools in Teaching and Learning English Vocabulary in Grade Three in Primary Schools in Nyamira County, Kenya.
1.20-1.40PM	***Getrude Mubweka, Robert Kati:*** Stem Revolution: Harnessing The Power of Arts, Languages, and Social Sciences
1.40-2.00PM	***Benard Nyasimi:*** Assessment of Utilisation of Computer Technology Tools in Teaching and Learning English Vocabulary in Grade Three in Primary Schools in

	Nyamira County, Kenya.
2.00-2.20PM	***Makoba Kizito, & Thuo Karanja****:* Transforming STEM Pedagogy: Feedback-Driven Professional Growth for Teachers"
PLENARY SESSION 3 **Moderator:** *Prof. Peter Bukhala* **Rapporteur:** *Mr. Erick Wendo*	
2.20-3.00PM	***Mrs. Jacinta Akatsa*** ***TOPIC: Coding in STEM: Inspire, Imagine, and Innovate***
3.00 – 3.20 PM	Q & A
	PLENARY SESSION 4
3.20-4.00PM	Andrey V. Koptelov, Ph.D ***TOPIC: Integrating AI in STEM Pedagogy: Transforming Education for the Future*** **Moderator:** *Prof. Catherine Aurah* **Rapporteur:** *Mr. Kwalia Cornelius*
4.00-4.20PM	Q & A
END OF DAY ONE	

DAY TWO: THURSDAY 14TH NOVEMBER 2024

TIME	ACTIVITY	RESPONSIBLE
7.00AM	Log-in and Registration	Secretariat
	PLENARY SESSION 5 **Moderator:** *Prof. Francis Orata* **Rapporteur:** *Mr. Nelman Obwengi*	
7.30-8.10AM	Dr. Maina A. B. Gioko PhD ***TOPIC: Advancing Technology and Equitable Access in STEM Education***	
8.10 – 8.30 AM.	Q & A	
	PRESENTATION SESSION 5 **Breakaway Room 1: VC's BOARDROOM** **Moderator:** *Dr Robert Kati* **Rapporteur:** *Mr. Harrison Omondi* Subtheme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions	
8.30-8.50AM	***Rose Atieno Opiyo:*** The Ghost in The Machine: AIs Disruptive Dance with Scientific Honesty and Publishing Integrity	
8.50-9.20AM	***Ayoti Caroline, Moses Poipoi:*** The Challenges Encountered During the Selection and Utilization of Instructional Media for Teaching Kiswahili in Public Secondary Schools in Vihiga County, Kenya	
9.20-9.40AM	***Joseph Muchiri Ndunda, Edwin Wamukoya, Roselyne Odiango:*** Assessment of The Attitude of Secondary School Students Towards Physical Activity Participation in Kakamega County, Kenya.	
9.40-10.00AM	***Jacob Shango Korofia, Esther Nyabuto, Stella Kabesa:*** Influence of Teachers Motivation on Academic Performance of Students with Learning Difficulties in Secondary Schools in Kakamega North Sub-County.	
10.00-10.20AM	***Lumiti Samuel , Moses Poipoi , Rose Opiyo:*** Psychosocial Stress and Adjustment during Covid 19 Pandemic Period In Kakamega Central Subcounty, Kenya	
10.20 – 10.40AM	***Benard Ouncho, Benedict Ondiek, Dennis Bulla***: Effect of Internet Banking on Financial Inclusion among Small Medium Enterprises in Kakamega County, Kenya	
10.40 – 11.00AM	***Felistus Nyamwoma, Moses Poipoi***: Peer factors on Effectiveness of Preventive Intervention for Substance Abuse among Secondary School Students of Kakamega	

	County
	PRESENTATION SESSION 6 **Breakaway Room 2: ABA 415** **Moderator:** *Dr Edwin Kanda* **Rapporteur:** *Mr. Erick Wendo* Subtheme2: **Advancing Technology and Equitable Access in STEM Education** **Subtheme 9: Harnessing AI-Driven Approaches within CBC Pathways to Elevate STEM Education**
8.30-8.50AM	***Lilian Nyaranga, Emma Mitchell, Catherine Aurah:*** Game-Based Learning in Mathematics: Lessons from the Development and Pilot Testing of the AddSub and MulDi Math Board Game
8.50-9.20AM	***Jean Pierre Alpha Munyaruhengeri, Odette Umugiraneza, Jean Baptiste Ndagijimana:*** Adoption and Actual use of GeoGebra in teaching Limits and Continuity of functions: Does teachers background matter?
9.20-9.40AM	***Lilian Nyaranga, Emma Mitchell, Catherine Aurah***: The Use of Game-Based Learning to enhance Algebra Mastery and Student Engagement through the Equation Explorer in Schools
9.40-10.00AM	*Benard Nyasimi:* Assessment of Utilisation of Computer Technology Tools in Teaching and Learning English Vocabulary in Grade Three in Primary Schools in Nyamira County, Kenya
10.00-10.20AM	***Peter Kibiwott Ngeny & Rose Atoni*:** Effects of Stem Education Programme on Chemistry Performance among Students in Extra County Secondary Schools in North-Rift Region, Kenya
10.20 – 10.40AM	***Edwin Mwilitsa, Sammy Kimoloi, Evans Raballah***: Hematological parameters dynamics in newly diagnosed pulmonary tuberculosis patients initiated on standard anti-TB treatment regimen
10.40 – 11.00AM	***Griffin Pilot,Peter Cherop, Emmanuel Osore***: Robot Manipulator Programming Via Demonstrative-Kinesthetic Teaching for Efficient Industrial Material Handling Applications
PLENARY SESSION 6 **Moderator:** *Dr. Rose Mutende* **Rapporteur:** *Mr. Harrison Omondi*	
11.00-11.40 PM	**Professor Vincent O. Onywera** Topic: **The Need for Science, Technology And Innovation In Promoting Sustainable Sports Excellence In Kenya**

11.40 – 12.00 PM	Q & A
	PLENARY SESSION 7 **Moderator:** *Dr. Rose Mutende* **Rapporteur:** *Mr. Harrison Omondi*
12.00-12.40PM	***Dr. David Muchangi Mugo*** ***TOPIC: Generative Artificial Intelligence on Higher Education in Kenya***
12.40-1.00PM	Q & A
	PRESENTATION SESSION 7 **Breakaway Room 1: VC'S BOARDROOM** **Moderator:** *Dr. Lydia Anyonje* **Rapporteur:** *Ms. Christine Onyango* Subtheme 3: **Diversity, Equity, and Inclusion in STEM** Subtheme 4: **STEM Education in Crisis and Emergency Settings**
1.00 – 1.20 PM	***Josephine Nyamwange, Edward Khasakhala***: Diversity, Equity And Inclusion In Stem Courses Among Girls In Public Universities In Kenya
1.20- 1.40PM	***D. Nanyende, Jacob Wakhungu:*** Management of Emergencies In Schools - Lessons From The 2004 Leptospirosis Outbreak In Bungoma County, Kenya
1.40-2.00PM	
	PRESENTATION SESSION 8 **Breakaway Room 2: ABA 415** **Moderator: Prof. Moses Poipoi** **Rapporteur:** *Ms. Sophie Mokua* Subtheme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions
1.00 – 1.20 PM	***Samuel Usolo, Annette Okoth, David Angwenyi:*** Modelling the impact of devolution on youth unemployment rates in Kenya using ARIMA-Intervention model
1.20- 1.40PM	***Sussanah Leppannen Otieno, Nancy Nabalayo, Okaya Khasakhala:*** Early Intensive Behavioural Intervention As A Predictor Of Development Of Social Communication Skills In Pre-Schoolers With Autism In Kakamega County, Kenya
1.40-2.00PM	***Caroleen Murunga Saya, Judith Achoka, Jason Nganyi***: Effect Of Teachers Achievement in Professional Knowledge and Practice Performance Contract Target on Pupils Academic Performance in Public Primary Schools Kakamega County,

	Kenya
	PRESENTATION SESSION 9 **Breakaway Room 1: VC'S BOARDROOM** **Moderator:** *Mr.* **Elvis Kauka** **Rapporteur:** *Mr. Brian Aondo* *Subtheme 5:* The Future of Work and Community Engagement in STEM Subtheme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions **Subtheme 8:** Integrating AI in STEM Pedagogy: Transforming Education for the Future
2.00-2.20PM	***Cyrus Muhanga:*** Effect Of Street and Non-Street Children's Characteristics on their schooling in Nakuru City, Kenya
2.20-2.40PM	***Christabel Ong'ayo, Issah Kweyu, Peter Bukhala:*** Life Skills Training And Behaviour Modification Among Youths In The Institutions Of Higher Learning
2.40-3.00PM	***Emmanuel Byiringiro***: Effect Of Class Size On The Academic Performance Of Students In Mathematics In Public Day Schools In Musanze District, Rwanda
3.00 -3.20PM	***Stephen K. Mbugua:*** Artificial Intelligence Driven Research and Development: Implications for Advancing STEM Education and Sustainable Solutions
3.20-3.40PM	***Wilberforce Jahonga, Consolata Ngala, Geoffrey Musera:*** STEM Academic Program Type & Graduate Unemployment Duration: Reviewing the Graduates of National Polytechnics in Kenya"
3.40 – 4.00PM	***Kipkorir Pius, Maxwell Mageto, Nicholas Ongwen:*** Mechanical properties of Al-Mg-Si alloys (6xxx series): A DFT based study
4.00 – 4.20 PM	***Joel Okutoyi, Maurine Kangahi:*** Integrating Artificial Intelligence in STEM Pedagogy: Transforming Deaf Education in Kenya Using AI for Kenyan Sign Language in Science Subjects
	PRESENTATION SESSION 10 **Breakaway Room 2: ABA 415** **Moderator:** *Dr. Caroline Wekulo* **Rapporteur:** *Mr. Sween Lipuku* **Subtheme 6: Interdisciplinary Approaches: The Role of Creative Arts, Languages, and Social Sciences in STEM** *Sub-theme 10:* **AI-Driven Research and Development: Implications for Advancing STEM Education and Sustainable Solutions**

2.00-2.20PM	***Aloys Iyamuremye, Innocent Twagilimana, Francois Niyongabo Niyonzima:*** Exploring the opportunities and challenges of using web-based discussions tools in teaching organic chemistry in Rwandan secondary schools
2.20-2.40PM	***Edwin Mwilitsa,Sammy Kimoloi, & Evans Raballah:*** Hematological parameters dynamics in newly diagnosed pulmonary tuberculosis patients initiated on standard anti-TB treatment regimen
2.40-3.00PM	***Livingstone Eshitika***: Interdisciplinary Approaches: The Role of Creative Arts, Languages, and Social Sciences in STEM
3.00 -3.20PM	***Christopher Wechuli Matete, Jairus Omuteche, Chrispinus Wasike*** STYLES IN THE CONSTRUCTION OF GENDERED SOCIO-CULTURAL SPACES IN LUHYA POPULAR SONGS: A case of Ali Akeko and Wanyama
3.20-3.40PM	***John Wenje, Robert Kati****:* APPROACHES TO SUSTAINABLE SOLUTIONS: BRIDGING STEM WITH SOCIETY Parental Role in Assisting Learners Acquire Entrepreneurial skills
3.40-4.00PM	
4.00-4.20PM	
PLENARY SESSION 8 **Moderator:** *Dr. Fridah Njeru* **Rapporteur:** *Mr. Cornelius Kwalia*	
4.20-5.00PM	Amb. Dr. Christine Obaigwa Owinyi ***TOPIC:*** *Harnessing AI-Driven Research and Development for Advancing STEM Education and Sustainable Solutions*
5.00 – 5.20 PM	Q & A
END OF DAY TWO	

DAY THREE: FRIDAY 15TH NOVEMBER 2024

TIME	ACTIVITY	RESPONSIBLE
7.00AM	Log-in and Registration	Secretariat
	PLENARY SESSION 9 **Moderator:** *Prof. Kennedy Bota* **Rapporteur:** *Ms. Velma Adhiambo*	
7.30-8.10AM	Dr. Benson Kituku ***Topic: Transforming STEM teaching and Learning by integrating generative Artificial Intelligence***	
8.10 - 8.30 AM	Q & A	
	PRESENTATION SESSION 11 **Breakaway Room 1: VC'S BOARDROOM** **Moderator:** *Prof. Kennedy Bota* **Rapporteur:** *Ms. Beldina Lipuku* **Subtheme 1: Integrating Sustainability into STEM Curricula** Sub-theme 2: **Advancing Technology and Equitable Access in STEM Education**	
8.30-8.50AM	***Catherine Aurah:*** Gender Bias in STEM among Kindergarten Learners (GEB-STEMKIL): Leveraging AI Games to Inspire Girls in STEM	
8.50-9.10AM	***Keithy Kamau, Benard Omondi:*** Effect Of Micro Lime on the Engineering Properties of Ambient Temperature-Cured Sugarcane Bagasse Ash-Based Geopolymer Concrete	
9.10-9.30AM	***Elizabeth Sisianoi Kilelo, Silvenus Konyole, Gordon Nguka***: Stakeholders' Characteristics Influencing The Implementation Of Food Security Projects In Vihiga County, Kenya	
9.30-9.50AM	***Eric Temba, Janet Kituyi, Catherine Aurah:*** Stem Curricula in Kenya, Is it Sustainable?	
	PRESENTATION SESSION 12 **Breakaway Room 2: ABA 415** **Moderator:** *Ms. Caroline Ayoti* **Rapporteur:** *Mr. Edgar Murunga*	

	Sub-theme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions
8.30-8.50AM	***Bonface Otedo, Peter Cherop, Emmanuel Osore*:** Study of Black Tea drying Process in Fluidized Bed Dryer Using Computational Fluid Dynamics
8.50-9.10AM	***Reuben Tum, Barasa Masinde, Peter Cherop:*** Effect of Sodium Carbonate Pretreatment and Pretreatment Duration on Total Solids of Maize Stalk: Response Surface Methodology Approach
9.10-9.30AM	***Paul Opio, Edwin Wamukoya Kadima:*** Sports Teachers Competences in Preparation and Implementation Of Physical Education In The Selected Primary Schools In Iganga District.
9.30-9.50AM	***Sylvester Anami, Ann Indeche, Kristiina Himanen, Shawn C Kefauver:*** East African HEI Network for Regional Digital Plant Pathology Study Modules
	PLENARY SESSION 10 **Moderator:** *Prof. Catherine Aurah* **Rapporteur:** *Ms. Sween Lipuku*
10.00-10.40AM	**KAIMOSI GIRLS HIGH SCHOOL STEM BUDDING SCHOLARS *:*** ***G. Kimakwa, B. Karimi, S. Muhonjaa, T. Chitechia, M. Ambasa, S. Afande:*** Topic: Exploring Biology through STEM Models
10.40-11.00AM	**Q/A**
	PRESENTATION SESSION 13 **VC'S BOARDROOM** **Moderator:** *Prof. Kennedy Bota* **Rapporteur:** *Ms. Christine Onyango* ***Sub-theme 7:*** Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions
11.00-11,20AM	***Marble Nandwa, Beatrice Sikuku N., Kaleb Mwendwa: Enhancing Secondary Mathematics Education in Kenya: A Review of Instructional Practices and Strategies for Improvement***
11.20-11.40AM	***Rodgers Wafula, Francis Muyekho, Evelyne Muleke, Leonard Wamocho, Joesph Munyasi, Ann Hoka:*** Exploiting Polyploidy in Napier grass (pennisetum purpureum Schum) For Increased Forage Yield
11.40-12.00PM	***Benard Ouncho, Benedict Ondiek, Dennis Bulla:*** Effect of Financial Innovation on Financial Inclusion among Small Medium Enterprises in Kakamega County, Kenya
	PRESENTATION SESSION 14 **Breakaway Room 1: VC'S BOARDROOM** **Moderator: Dr. Geofrey Musera Rapporteur: Doreen Muriithi**

	Sub-theme 7: Contemporary Issues in Science, Technology, and Society: Bridging STEM with Society for Sustainable Solutions
12.00-12.20PM	***David O. Ng'anga, M. Mageto, H. Golicha, F. Gaitho:*** The Effect of Sunflower Oil and Water on Thermal Storage Parameters of a Flat Plate Solar Water Heating Collector
12.20-12.40PM	***Caroleen Murunga Saya, Judith Achoka, Jason Nganyi:*** Teachers Achievement in Comprehensive Learning Environment Performance Contract Target Effect on Pupils Learning Outcomes in Public Primary Schools in Kakamega County, Kenya
12.40-1.00PM	***Elvira Lwanga, Moses Poipoi, Patricia Kariaga:*** Does Community Policing Succeed In Mitigating Crime? Empirical Evidence From Lurambi Sub County
1.00-1.20PM	***Beatrice Muzame, Elizabeth Omukunda, Patrick Okoth, David Mulama:*** Distribution of Plasmodium Species and Effect of Time Trend on Malaria Prevalence in Mbale Township, Western Kenya
1.20-1.30PM	**HEALTH BREAK**
	PRESENTATION SESSION 15 **Breakaway Room 2: ABA415** **Moderator: Dr. Epari Ejakait** **Rapporteur:** *Ms Sophy Mokua* *Sub-theme 11:* **Enhancing Linguistic Proficiency for Effective STEM Learning and Communication**
12.00-12.20PM	***Christopher Wechuli Matete, Jairus Omuteche, Chrispinus Wasike:*** Styles in the Construction Of Gendered Socio-Cultural Spaces in Luhya Popular Songs: A Case of Ali Akeko And Wanyama
12.20-12.40PM	***Rebin Obwang'I, David Barasa, Robinson Oduma:*** **A Morphological Analysis of Abbreviated Neologisms of Social Media Discourses: A Case of Kenyans on X**
12.40-1.00PM	***Josephine M. Maingi:*** Preparing Future Scientists: Language Proficiency as a Foundation for STEM Communication
1.00-1.20PM	***Beatrice K.C Obwoge:*** The Role of Emoticons in the Teaching of English Language to Leverage STEM in Schools in Turkana County
1.20-1.30PM	**HEALTH BREAK**
	PLENARY SESSION 11 **Moderator:** *Dr. Geofrey Musera* **Rapporteur:** *Ms. Velma Adhiambo*
1.30-2.10PM	**Dr. Cecilia Wandiga** **TOPIC:** *Women at the Nexus of EcoChemistry and Sustainable Urban Construction: Bridging with Society for Holistic Sustainable Solutions*
	Q & A

	PRESENTATION SESSION 16 **Room 1: VC'S BOARDROOM** **Moderator: Dr. Beatrice Shikuku Rapporteur: Josephine Nyamange**
2.10-2.30PM	*Aloys Iyamuremye, Innocent Twagilimana, Francois Niyongabo Niyonzima:* Exploring the opportunities and challenges of using web-based discussions tools in teaching organic chemistry in Rwandan secondary schools
2.30-2.50PM	*Otenyo Philip M., Masibayi Edsward N.:* Efficiency of Pumice-Sand Granular Filter in Removing Effluent Wastes in Shirere Wastewater Treatment Plant in Kakamega County, Kenya
3.10-3.30PM	***Alphayo Ocholla, Catherine Aurah, Raphael Ongunya:*** Improving Accuracy Level in Measurements of Current and Voltage by use of Electronics Practical Workbench in Physics High School Physics Practical Work
3.30-3.50PM	***Rodgers Wafula, Francis Muyekho, Evelyne Muleke, Leonard Wamocho, Joesph Munyasi, Ann Hoka:*** Exploiting Polyploidy in Napier grass (pennisetum purpureum Schum) For Increased Forage Yield
3:50-4.10PM	***Wafula N. K, Bota K. N, Kabuka E. K*:** Learning Difficulties, Self-esteem and Academic achievement in Kenyan Secondary schools
	PLENARY SESSION 12 **Moderator: Prof. Peter Bukhala Rapporteur: Josephine Nyamange**
4.10-4.50PM	***Danise Engle Sam*** ***Topic:*** Artificial Intelligence in Education (AIEd) Tools (AI and ChatGPT): Exploration of various AIEd tools and technologies that are shaping modern education
4.50-5.00PM	**Q & A**
CLOSING CEREMONY	
5.00-5.10PM	**Conference Chair**
5.10-5.20PM	**Deputy Vice Chancellor, PRI**
5.20-5.30PM	**Vice Chancellor**
5.30-5.40PM	**NATIONAL ANTHEM**
DELEGATES LEAVE AT THEIR OWN PLEASURE	
END OF DAY THREE/CONFERENCE	

ABSTRACTS

1. Does Community Policing Succeed In Mitigating Crime? Empirical Evidence From Lurambi Sub County

Elvira Lwanga, Moses Poipoi, Patricia Kariaga

lwangaelvira@gmail.com, wpoipoi@mmust.ac.ke, pkariaga@mmust.ac.ke

Abstract

Increased cases of insecurity and crime are the major challenges affecting many societies globally. Kenya is not an exception thus community policing was adopted to enhance security and safety, reduce crime, fear and improve social order in the neighborhoods through engagement of the community members and police. However, crime rate in some counties remains high. Therefore, the study sought to examine the influence of community policing on crime reduction in Lurambi Sub-County. Broken windows Theory and Systems Theory guided the study. The study employed a descriptive research design, and adopted stratified sampling technique and purposive sampling techniques to obtain sample units. The target population of the study was 1182 being community members, Nyumba Kumi leaders, police officers and National Government Administration Officers. Stratified random sampling and simple random sampling techniques were used to select community members who were the primary respondents for the study while purposive sampling was used to select key informants being police officers, Nyumba Kumi leaders and National Government Administration officers. A sample of 284 community members was used during data collection while 21 Nyumba Kumi leaders, 19 police officers and 5 National Government Administration Officers were also sampled to take part in the study. A questionnaire was used to collect data from community members, interview schedule was used to collect data from police officers and National Government Administration Officers while a Focus Group Discussion Guide was used to collect data from Nyumba Kumi leaders. The quantitative data was processed and analyzed using the Statistical Package for Social Sciences (SPSS) version 28.0 for windows while the collected qualitative data was analyzed thematically in line with the study objectives. Results were presented using tables and figures. The study findings revealed a statistically significant relationship between community policing initiatives and crime reduction in Lurambi Sub-County ($r= 0.574$, $p<0.05$). In light of the findings made, the study concluded that the Police-Community partnership method has a significant and positive effect on the crime reduction hence recommended coordination of the developed national crime reduction strategy based on the Nyumba Kumi initiative to monitor, evaluate and report on the progress made in the implementation of community policing only in Lurambi Sub-County but also at National level and beyond.

Key Words: community policing, mitigating crime, nyumba kumi

2. Effect of Financial Innovation on Financial Inclusion among Small Medium Enterprises in Kakamega County, Kenya

Benard Ouncho, Benedict Ondiek, Dennis Bulla

benardomae2@gmail.com, bondiek@mmust.ac.ke, dbulla@mmust.ac.ke

Abstract

Despite the noble duty of SMEs of promoting economic development in the economy, financial inclusion is yet to be achieved. As at the end the year 2023, financial inclusivity was still not yet fully achieved. The general objective was to establish the effect of financial innovation on financial Inclusion among SMEs in Kakamega County, Kenya. Specifically, the study determined the effect of mobile banking, agency banking and internet banking on financial inclusion among SMEs in Kakamega County. The study established the moderating effect of firm size on the association between financial innovation and financial inclusion among SMEs in Kakamega County, Kenya. This study was guided by diffusion innovation theory, financial intermediation theory, agency theory and markets imperfection theory. Descriptive and causal design were adopted for a target of 9116 SMEs, of which 369 SMEs owners were sampled and used questionnaires for data collection. Reliability was tested using Cronbach alpha whereas validity through content analysis of the expert opinion. Analysis of the data was based on inferential as well as descriptive statistics. The study established that financial innovation parameters; mobile banking ($p=0.003$ at $P<.005$), Agency banking ($p=0.002$ at $P<.005$), and Internet banking ($p=0.000$ at $P<.005$) had a positive correlation coefficient. Lastly, the size of business had a moderating positive correlation coefficient ($p=0.000$ at $P<.005$). The results also showed that the financial innovation variables had a significant relationship on financial inclusion, hence SMEs should increase the uptake of mobile banking, internet banking, and agency banking services available and accessible to enable convenient operations and transacting hence financial inclusion. Finally, the study findings showed that the size of business was of significance on financial innovation and financial inclusion, hence business owners should make an effort to grow their businesses. Research results may be of help to SMEs in assessing the significance of financial innovation towards accessing timely and affordable financial facilities. As a result, this may enable SMEs to access financial products and services such as loans more conveniently and cheaply, thereby increasing their financial muscle and improving their operations, hence yielding more profits.

Key Words: Financial Innovation; Financial Inclusion; Mobile Banking; Agency Banking; Internet Banking

3. Extent of Multimedia Instructional Resources Utilization in Teaching Science and Technology in Grade 6 in Western Kenya

Isaac Macheso, Robert Kati

machesokraft@gmail.com, *rkati@kibu.ac.ke*

Abstract

Science and technology education in primary school serves as a foundation in our modern technology-driven society. It plays a critical role in sustainable development by equipping learners with skills necessary to address complex challenge in our modern society. This is achieved by developing critical thinking and problem solving skills and encouraging environmental awareness and responsibility in learners. However despite the acknowledged benefits of science and technology education, there still exist challenges in its effective implementation, evident from 2023 Kenya Primary School Assessment (KPSEA) results where Science and technology recorded the least mean mark (41.15) nationally among the 11 learning areas. Studies done on challenges facing CBC implementation indicate that there are concerns about inadequate instructional resources needed to facilitate learning with the view of attaining the core competencies. This paper explored the extent of multi-media instructional resources utilization in teaching science and technology in Grade 6 in selected primary schools in Western Kenya. The study was conducted in Trans-Nzoia, Bungoma and Busia Counties in Kenya. It was grounded on Stafflebeamâ€™s CIPP model targeting head-teachers and their respective grade 6 science and technology teachers. Mixed methods research design was used. Cluster and simple random sampling technique was used in coming up with the three counties. Stratified sampling was used to categorize the school into two groups, 1,653 public and 768 private. In each of the two strata, simple random sampling was used while choosing 246 participating schools from a population of 467 public and 221 private in Busia, 802 public and 291 private in Bungoma, and 384 public and 256 private in Trans-Nzoia Counties. Simple random sampling was also used in selecting participating teachers in schools with two or more science and technology teachers teaching Grade 6. Questionnaire for grade 6 science and technology teachers and interview guide for head-teachers were used to collect data. The collected data was analyzed descriptively in order to bring out the overall descriptions of the extent of multi-media instructional resources utilization in Grade 6 in Western Kenya. The study found that multimedia instructional resources are utilized to some extent in teaching science and technology in Grade 6 in selected schools in Western Kenya (M 3.1421, SD 1.9201). The study recommended Kenya Institute of Curriculum Development (KICD) to develop and distribute offline digital solutions to schools loaded with science content that can be used without internet access. KICD should also place a high priority on developing and broadcasting science lessons via local radio stations, which are widely accessible even in remote areas. Teachers on the other hand are

encouraged to use available multimedia instructional resources gadgets like smart phones in resource-constrained and emergency settings. This study will contribute to a deeper understanding of multimedia instructional resources utilization in teaching science and technology in Kenyan context, which can inform efforts to improve science and technology effective curriculum implementation even with limited resources.

Keywords: Multi-media Instructional Resources

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4. Exploring Biology through STEM Models

Godfrey Kimakwa, Betty Karimi, Susan Muhonjaa, Terry Chitechia, Mishel Ambasa, Susan Afande

kimakwag@gmail.com

Abstract

The project titled "Exploring Biology through STEM Models" aims to enhance students' understanding of biological concepts by integrating principles of Science, Technology, Engineering, and Mathematics (STEM) into hands-on learning experiences. Targeting middle to high school students, this project involves students creating both physical and digital models to represent key biological topics such as cell structure, genetics, human anatomy, and ecosystems. The project is structured into five phases over duration of 4-6 weeks, beginning with topic selection and research, where students identify a specific biology subject and gather relevant information. In the second phase, students design and construct physical models using various materials, while also developing digital representations through 3D modelling software. The third phase includes peer review and refinement of their models based on feedback, fostering collaboration and critical thinking. In the fourth phase, students present their models, explaining the biological concepts represented and the STEM principles employed in their design. They will be assessed on their understanding, creativity, clarity, and teamwork. Finally, in the reflection phase, students will articulate their learning experiences through individual reflection papers and engage in class discussions to reinforce their understanding of the integration of STEM in biological education. By encouraging interactive and collaborative learning, this project seeks to not only deepen studentsâ€™ comprehension of complex biological systems but also to foster essential skills such as teamwork, critical analysis, and effective communication. Ultimately, "Exploring Biology through STEM Models" serves as a model for innovative education that bridges the gap between theoretical knowledge and practical application, promoting a lifelong interest in STEM fields and the biological sciences.

Key Words: STEM Models, 3D; integrating; understanding, Biology Concepts, Digital Representations

5. Effect Of Micro Lime on the Engineering Properties of Ambient Temperature-Cured Sugarcane Bagasse Ash-Based Geopolymer Concrete

Keithy Kamau, Benard Omondi

keithyole@gmail.com, bomondi2006@gmail.com

Abstract

The use of cement in the building sector is environmentally unsustainable due to significant carbon emissions. Advancing concrete technology places geopolymer concrete as a potential green concrete by completely replacing Ordinary Portland Cement. However, the geopolymerization process is initiated at elevated temperatures, which demands that curing at elevated temperatures be conducted for several hours, limiting its application. Calcium ions in Geopolymer concrete (GPC) allow the formation of Calcium Aluminate Silicate and Calcium Silicate Hydrate gels, allowing ambient temperature curing. To study the effect of micro lime on the engineering properties of ambient temperature-cured sugarcane bagasse ash-based GPC, this research used Sugarcane Bagasse Ash (SCBA) as source material; one part of sodium Hydroxide 16M solution and two parts of sodium silicate were used as the alkaline activator. Crushed stones and river sand were utilized as the coarse and fine aggregates, respectively. A sodium naphthalene formaldehyde (SNF) based superplasticizer was added at 3% of the SCBA. Micro lime was added as an admixture in varying proportions as a percentage weight of SCBA. In the fresh state, it was found that the workability decreased with the increase of micro lime content. The ambient temperature curing of the SCBA-based GPC was achieved at a 1% addition of the micro lime. The SCBA-based GPC's compressive strength increased with the micro lime increase, up to 7%. The ambient temperature-cured SCBA-based GPC at 3% had the best water absorption resistance. The SCBA-based GPC had no significant weight loss on 2.5% sulfuric acid exposure. The 5 and 7% micro lime mix had no significant change in compressive strength under the condition of sulfuric acid, unlike the 0,1 and 3%. The results from this research contribute to the body of knowledge on ambient temperature-cured SCBA-based geopolymer concrete. It reveals the possibility of expanding the applications of GPC made from the locally available source material, SCBA.

Key Words: Ambient Temperature Curing, Compressive strength, Durability, Geopolymer concrete, Green Concrete, Sugarcane Bagasse Ash (SCBA)

6. Examining the Impact of the Investigated-Based Multiple Representation (IBMR) Learning Model on Mechanics Problem-Solving among Engineering Students at a Selected Public Higher Education College in Rwanda

Theogene Niyomufasha, Celestin Ntivuguruzwa, Leon Mugabo

theogniyo@gmail.com, ntivuguruzwacelestin1@gmail.com ,mugabol20000@yahoo.com

Abstract

The Investigative Based Multiple Representation (IBMR) Learning Model is a novel way to study mechanics in engineering education that emphasizes inquiry-based learning and different representations. This approach deals with the constraints of traditional teaching approaches that rely on memorization and formulaic problem-solving, resulting in a thorough comprehension of complicated physical concepts. This study seeks to investigate the impact of the IBMR learning paradigm on mechanics problem-solving abilities at a Rwandan public higher education college. This study was designed as a quasi-experiment with pre-test and post-test periods for two groups. Socio-constructivism theory served as the study's framework. This study included 140 first-year engineering students who were specifically chosen purposively. A problem-solving ability exam was administered to each group before and during the mechanics teaching and learning intervention. The data collection methods included validation and testing. Two experts determined that the teaching materials were valid and could be utilized to develop mechanics problem-solving abilities. The dependability coefficient for the research instrument was 0.83. The collected data descriptive and inferential statistics were analyzed using SPSS 26. The IBMR learning model significantly improved students' mechanics problem-solving ability ($p<0.001$), with a mean N-gain score of 0.49 for the experimental group and 0.21 for the control group. The findings revealed that the IBMR learning model had a favorable and transformative effect on engineering students' mechanics problem-solving abilities and was therefore recommended for physics teaching and learning in Rwandan tertiary education.

Key Words: Mechanics, IBMR Learning Model, Problem-solving ability, engineering students

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7. Styles in the Construction Of Gendered Socio-Cultural Spaces in Luhya Popular Songs: A Case of Ali Akeko And Wanyama

Christopher Wechuli Matete, Jairus Omuteche, Chrispinus Wasike

meetchris88@gmail.com, jairus.omuteche@gmail.com, wasikech@yahoo.com

Abstract

This study sets out to examine the selected popular songs of Akeko and Wanyama with a view to explore the strategies employed by these two Luhya popular musicians in their depiction of women images and gendered sociocultural issues. The impetus of this study was borne out of the realization that popular songs whose medium of communication is music have become an important avenue for social communication as a form of text. As popular songs do not exist in isolation of the people who produce and consume them, the songs are important in understanding the people and the culture they emanate from. Popular songs projected through music communicate seductively to their audience imposing on them the need to take positions on day to day issues. This study was guided by a research question: Which strategies are employed by Wanyama and Akeko in depicting women images? To help rationalize the area of engagement, the study used Ethnopoetics and feminist literary criticism for conceptual analysis and interpretation of the texts. Feminist literary criticism was significant in helping us to understand how women are portrayed in the Luhya songs of Akeko and Wanyama. Ethnopoetics helped us to actualize the seleted oral songs into a written text and in unraveling the meaning and mood in the selected songs of Wanyama and Akeko. Critical analysis of the songs and mixed method research that uses a sequential exploratory design were useful in collecting data. Purposive sampling was used in the selection of the songs which were taken as cultural texts that portray women in their images and reveal their gender roles and stereotypes. These texts were subjected to literary analysis to appreciate their content and aesthetic wealth, and further apprehend the treatment of women both metaphorically and non metaphorically in the songs. The study revealed that the songs of the two musicians have gendered discourses that depict women both positively and negatively in their various capacities, the Luhya popular songs of Akeko and Wanyama reveal soceietal gendered socio-cultural attitudes and gender roles on women where by certain duties are only performed by women and not men. The findings of this study will shed light on the societal attitudes towards women in the wider Luhya community that the two artists come from. This study will help literary scholars, gender activists, musicians and sociologists to delve further in gender dynamics of the community and improve their areas of concern especially in relation to the Luhya community.

Key Words: Gender, Gender Identity, Literary Text, Song, Stereotype, Women and Culture

8. Leveraging AI-Enhanced Pedagogies to Strengthen STEM Education in Kenya's Competency-Based Curriculum

Mervyn Odeo

modeo@mmust.ac.ke

Abstract

AI has emerged as one of the most revolutionary technologies in education that provides new solutions to improve the learning and teaching processes. As such, the integration of AI to the Kenyan Competency-Based Curriculum (CBC) offers a chance to transform the teaching and learning of STEM subjects and enhance students competencies. This paper aims at examining the use of Artificial Intelligence (AI) in enhancing Science, Technology Engineering and Mathematics (STEM) education in the context of Kenya's Competency Based Curriculum (CBC). The purpose of this research is to assess how the CBC framework can be used to assess the effects that AI has on STEM education and come up with ways of how AI can be incorporated into the classroom for the enhancement of critical thinking, problem solving and creativity. AI has been implemented effectively in education across the globe, and this is as the case for Kenya's STEM education under CBC. The major limitations are lack of strategic direction as to the areas where AI can be applied, lack of infrastructure and the ethical issues which are barriers to appropriate use of AI technologies for CBC goals. This study seeks to answer these questions by analyzing AI's impact on the educational achievement and recommending specific measures for Kenya. The study adopted a descriptive research design to arrive at the findings. The study involved 70 public primary schools in Lurambi Constituency of Kakamega County, with primary school teachers, school officials, primary school pupils (Grade 4, 5, and 6) and local education authorities as respondents. The study used stratified random sampling which gave a total of 384 participants, and the data was collected through interviews, questionnaires and document analysis. Quantitative data was analyzed with SPSS while the qualitative data was analyzed through themes. The result showed that the most frequently used AI tools in STEM education under CBC were the personalized learning (45%) and virtual labs (25%), among which virtual lab was rated the most effective with the effectiveness score of 4.5 out of 5. It was also established through regression analysis that virtual labs and personalized learning enhanced learning performance. Nevertheless, issues such as lack of teacher training (75%), high costs of implementing AI (70%) and inadequate infrastructure (68%) were raised as key challenges which underpin the importance of having a sound AI investment plan. In light of the findings, it is possible to state that the analyzed AI-based solutions have a high potential to influence the improvement of STEM education in the framework of Kenya's CBC, but their integration poses a number of challenges. This paper therefore suggests that further research be done on the ethical issues in the integration of AI in education such as the data privacy and equity issues and studies on the effects of AI in teaching and learning of STEM subjects in the future.

Key Words: AI, STEM education, CBC, Personalized Learning, ITS, Assessment tools, Kenya.

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9. Stem Revolution: Harnessing The Power of Arts, Languages, and Social Sciences

Getrude Mubweka, Robert Kati

getrudemubweka@gmail.com, rkati@kemi.ac.ke

Abstract

Traditional STEM fields in Science, Technology, Engineering, and Mathematics often miss out on the benefits of including Creative Arts, Languages, and Social Sciences. By not integrating these areas, there is accompanied limited potential for innovative thinking and comprehensive problem-solving. Based on the growing recognition that interdisciplinary approaches can enhance creativity, improve problem-solving capabilities, and foster a more inclusive and global perspective in STEM fields. The purpose of this paper is to investigate how incorporating these disciplines into STEM can address critical gaps and drive transformative change. The study will involve a comprehensive systematic literature review of 50 recent studies and will analyze 10 case studies from educational institutions and industry practices, employing both qualitative and quantitative methods, including surveys and interviews. The findings are expected to provide a guideline for integrating Creative Arts, Languages, and Social Sciences fosters creativity, improves critical thinking, and enhances cultural awareness among students and professionals. This interdisciplinary approach is expected to lead to more innovative solutions and effective problem-solving across various STEM fields. The paper will advocate for a paradigm shift in STEM education, proposing strategies for the effective integration of these disciplines to better address complex global challenges, providing actionable insights for educators and industry leaders to enhance STEM education and practice through interdisciplinary approaches.

Key Words: STEM education, interdisciplinary integration, Creative Arts, Social Sciences, innovation, educational outcomes

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10. Parental Role in Assisting Pupils Acquire Entrepreneurial Skills

John Wenje Nyongesa, Robert Kati

johnwenje70@gmail.com, rkati@kibu.ac.ke

Abstract

Competency Based Curriculum (CBC) requires pupils to acquire essential skills that will assist pupils be self-reliant in everyday life, in and outside school. Some of the skills are critical thinking, communication, problem solving and learning to learn. This paper explores the intersection of social sciences and STEM education by examining ways in which parents in Kenya assist lower primary school pupils in acquiring entrepreneurship skills at Early Years of Education (EYE) embracing interdisciplinary approach to sustainable solutions, therefore bridging STEM with society. Parental assistance to pupils in take home assignments leads integration of technology, science and innovation concepts that enhance STEM learning outcomes by embedding entrepreneurial thinking from an early age. The research investigated key strategies used by parents to impart entrepreneurship skills to pupils. The study was informed by Systems theory. The study was conducted in three counties of Busia, Bungoma and Trans Nzoia, Kenya. Purposive and simple random sampling was used to obtain teachers, pupils and Parents Association representatives (PAs). The sample of the study was 1256 participants comprising 689 teachers, 379 grade 3 pupils and 188 PAs. The study adopted a descriptive survey design. Questionnaire was used to collect data from teachers, interview guide from parents and Observation schedule from pupils. The study yielded qualitative data that was analyzed thematically and quantitative data which was analyzed using IBMSPSS 28.0 statistics software. Findings were presented by use of means and frequency tables, From the findings it was concluded that, parents did not fully assist pupils in take home assignments due to different reasons. It was recommended that; the government should ensure provision of learning resources and Parents should be sensitized on their engagement in supporting pupils during acquisition of Entrepreneurship skills."

Key Words: Entrepreneurship, Interdisciplinary Approaches, Parental Engagement

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11. A Qualitative Investigation on Learners Experiences and Understanding of Transformation Geometry with Van Hiele Phased Instruction and Technology-Enhanced Van Hiele Phased Instruction

Issa Ndungo, Sudi Balimuttajjo, Edwin Akugizibwe

ndungoissa@yahoo.com

Abstract

This study qualitatively examined learners' understanding of transformation geometry using two instructional approaches: Traditional Van Hiele Phased Instruction (VHPI) and Technology-Enhanced Van Hiele Phased Instruction (TVHPI) with GeoGebra. Conducted in six secondary schools in mid-western Uganda, it involved two groups of S.3 students in each school, one receiving VHPI and the other TVHPI. Eight students from each school were interviewed to represent a range of gender, instructional strategies, and achievement levels. Findings revealed that many students, particularly in the VHPI group, faced challenges in grasping geometric concepts, necessitating additional support. TVHPI, leveraging GeoGebra, showed a significant advantage in enhancing engagement and visualization skills. Both instructional approaches improved students' conceptual understanding, but TVHPI was more effective in fostering deeper engagement and overcoming conceptual difficulties. The importance of integrating technology like GeoGebra in geometry instruction to improve student comprehension, while also emphasizing the need for personalized support and guided instruction is highlighted. The proposed Geometry Pedagogical Improvement Cycle (GeoPIC) offers a structured model for continuous enhancement of geometry teaching, balancing traditional methods and technology-enhanced strategies to meet diverse learner needs.

Key Words: Transformation Geometry, learners experiences, Van Hiele levels, Technology, GeoGebra

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12. The Ghost in The Machine: AIs Disruptive Dance with Scientific Honesty and Publishing Integrity

Rose Atieno Opiyo

ropiyo@mmust.ac.ke

Abstract

Integration of Artificial Intelligence (AI) into academic research is garnering significant attention among knowledge generators and consumers. While AI offers remarkable capabilities in research facilitation, data analysis and visualization, grave concerns have been raised about AIs academic dishonesty on an unprecedented scale as well as ethical dilemmas in co-authorship. This paper maps existing literature and discusses how AI-generated research and publishing is reshaping traditional notions of scientific inquiry, authorship, originality, and peer review. It presents specific

incidents where reliability and integrity of AI-assisted research and publication has been challenged. It goes further to present legal and ethical implications as well as measures adopted by global leading publishing houses and research centers. This was based on a comprehensive search of peer-reviewed literature and gray sources published between 2015 and 2024. Databases included Web of Science, Scopus, IEEE Xplore, and arXiv. I also examined relevant conference proceedings and industry reports. Studies were included if they addressed any aspect of AI's impact on scientific inquiry, academic writing and publishing integrity. Data were extracted and synthesized using a predefined charting form. The review included 127 sources. Key themes emerged: (i) AI academic dishonesty and publishing integrity concerns (ii) ethical dilemmas posed by AI co-authorship (iii) evolving concepts of authorship and attribution in the age of AI; (iv) challenges to peer review processes; (v) legal and ethical implications of AI in publishing and (vi) measures adopted by publishing houses and research centers. Results indicate that AI presents significant challenges in scientific inquiry and academic writing but also holds great promise for advancing research, offers opportunities for innovation in content creation and allows verification, and distribution within the publishing ecosystem. This paper concludes by proposing a set of best practices for screening, robust quality control and stringent editorial processes for authors, journal editors, publishers, academic institutions, funding agencies, professional societies, regulatory bodies and tech developers in navigating this new landscape. Overall, this paper advocates for a balanced approach that harnesses the benefits of AI while safeguarding the core values of publishing integrity.

Key Words: Artificial Intelligence Scientific inquiry, Publishing Integrity, Academic Dishonesty, AI Detection, Copyright Law, Peer Review, Authorship Ethics

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13. Gender Bias in STEM among Kindergarten Learners (GEB-STEMKIL): Leveraging AI Games to Inspire Girls in STEM

Catherine Aurah

cmusalagani@mmust.ac.ke

Abstract

Gender disparities in STEM (Science, Technology, Engineering, and Mathematics) fields emerge early in life, often influenced by societal norms and education systems that subtly reinforce gender biases. In Kenya, the gender gap in STEM education begins as early as kindergarten, where cultural stereotypes, teacher biases, and traditional learning methods play pivotal roles. This study investigates the use of AI-based educational games as a tool to counteract gender bias in STEM among kindergarten learners in Kenya. Through a desktop review of recent literature (2020-2024), this paper examines the roots of gender bias in early STEM education and explores how AI-powered learning tools can foster gender parity. The findings indicate that AI games designed to

promote curiosity, collaboration, and problem-solving skills help break down gender stereotypes and improve girls' participation in STEM activities. Key statistics on gender representation in STEM across educational levels, combined with case studies from early interventions, illustrate the potential for AI-based solutions to drive transformative change.

Key Words: Gender bias, STEM education, AI games, gender parity, Kindergarten

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14. Game-Based Learning in Mathematics: Lessons from the Development and Pilot Testing of the AddSub and MulDi Math Board Game

Lilian Nyaranga, Emma Mitchell, Catherine Aurah

lnyaranga@elimushop.com, partner@inspireherstem.org, aurahcatherine@gmail.com

Abstract

This game-based learning project presents new opportunities for enhancing mathematics instruction and improving student outcomes. This research focuses on the development and piloting of the AddSub and MulDi math board games, designed to align with the primary school mathematics curriculum. Targeting students in grades 3 to 6, the games offer an interactive and engaging learning experience that fosters numeracy skills, critical thinking, problem-solving, and collaboration. By using game-based learning, students are encouraged to approach mathematics in a more dynamic and enjoyable manner. The AddSub and MulDi math board games were piloted among over 300 diverse groups of teachers and learners during mathematics lessons. The findings revealed positive feedback on the game's impact on student engagement and learning. The prototypes adaptability to different ability levels and its versatility across grade levels make it a powerful instructional tool for teachers. The findings from this study provide valuable insights into the role of game mechanics in promoting equitable access to STEM education, especially in mathematics. This research contributes to the growing body of knowledge on innovative teaching strategies in STEM and supports the integration of game-based learning as a means to transform mathematics education in Kenyan schools.

Key Words: Game-based learning, educational innovation, student engagement; AddSub and MulDi math board games

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15. Exploiting Polyploidy in Napier grass (pennisetum purpureum Schum) For Increased Forage Yield

Rodgers Wafula, Francis Muyekho, Evelyne Muleke, Leonard Wamocho, Joesph Munyasi, Ann Hoka

fmuyekho@mmust.ac.ke , emmbone@mmust.ac.ke, samitawamocho57@gmail.com, joseph.munyasi@kalro.org, annindetie@yahoo.com

Abstract

Napier grass (Pennisetum purpureum) is a key forage crop in Kenya. However, its yield and quality are often hindered by headsmut and stunt disease. Genetic improvement through mutation breeding, particularly using colchicine to induce polyploidy, offers a potential solution for improving Napier grass. This study aimed to evaluate the response of embryogenic calli to different colchicine concentrations (0, 0.05, 0.1, and 0.2%) over 24, 48, and 72 hours duration to induce polyploidy in South african and Bana napier grass germplasms. The most suitable media for shoot regeneration was Murashige and Skoog (MS) medium supplemented with 0.2 mgL-1 Benzyl Adenine (BAP), 0.1mgL-1 dichlorophenoxyacetic acid (2, 4-D) and 0.1mgL-1 Indole-3-Butyric Acid (IBA) while media with 1mgL-1IBA, 1mgL-1 2, 4-D and 0.5mgL-1 BAP was more suitable in inducing embryogenic calli in all genotypes. Chromosome doubling was confirmed through chromosome counting and stomatal size, and number. Results showed that a 0.1% colchicine concentration with a 48-hour treatment was most effective for producing mutant plantlets, while higher concentrations were toxic. The stomata size and number of derived octoploid plantlets were bigger with lower density, had shorter plant height, smaller stem diameter and despite being the first to produce tillers, they were significantly higher than their progenitors. Induced mutants also had a significantly higher number of chromosome and showed different band patterns and distance during gel electrophoresis. The promising Napier grass mutants selected through the study are valuable genetic resources for enhancement and breeding

Key Words: Napiergrass, Colchicine, Induced Mutation, Polyploidy, Genotype Improvement

Introduction

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16. Improving Accuracy Level in Measurements of Current and Voltage by use of Electronics Practical Workbench in Physics High School Physics Practical Work

Alphayo Ocholla, Catherine Aurah, Raphael Ongunya

aocholla@kicd.ac.ke, aurahcatherine@gmail.com, rodhiambo@mmust.ac.ke

Abstract

Physics can be approached through both theoretical and practical lenses. In Kenya, practical assessments contribute approximately 20% to 40% of the overall physics score in the Kenya Certificate of Secondary Education for students in basic education. To achieve high marks in

practical physics, students must demonstrate both accuracy and precision. The Practical Workbench serves as a tool for teaching and engaging in practical activities, enabling students to observe and interact with experimental materials and apparatus. This workbench allows users to construct both analog and digital simulated circuits. The objective of the study was to evaluate whether students utilizing an electronics practical workbench for their experiments achieved more precise measurements of voltage and current in their reports compared to those employing traditional methods. The research utilized a quasi-experimental design featuring a non-equivalent group pre-test and post-test approach. The control groups were subjected to conventional practical teaching methods, whereas the experimental groups engaged with a practical workbench for electronics-related tasks. Data collection involved focus group discussions, interviews with physics instructors, and assessments of practical performance. The instruments were validated by experts in science education and seasoned secondary school physics educators, while the reliability of the practical examinations was evaluated using the Pearson Moment Correlation Coefficient.

Key Words: Physics education, practical work, Kenya Certificate of Secondary Education (KCSE), practical physics, accuracy and precision, electronics practical workbench and electrical circuit.

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17. Adoption and Actual use of GeoGebra in teaching Limits and Continuity of functions: Does teachers background matter?

Jean Pierre Alpha Munyaruhengeri, Odette Umugiraneza, Jean Baptiste Ndagijimana

jmunyaruhengeri2021@gmail.com, odetteumugiraneza7@gmail.com *jndagijimana@yahoo.com*

Abstract

In today's world, the integration of technology in education, particularly the use of GeoGebra, has gained increasing importance in enhancing educational processes anytime and anywhere. However, the adoption of GeoGebra by teachers remains a complex issue. This study aims to examine how teachers' backgrounds influence the adoption of GeoGebra and proposes an appropriate model for its successful integration. Four external variables teachers' backgrounds, perceived usefulness of GeoGebra, perceived ease of use, and attitudes toward using GeoGebra were analyzed to develop the model. A mixed-methods approach was employed, combining quantitative and qualitative research. A survey of 214 teachers provided quantitative data, while in-depth interviews with 10 teachers enriched the qualitative insights. Exploratory factor analysis, conducted using SPSS 27, revealed that the factor loading of perceived ease of use was less than 0.4, leading to the exclusion of this variable from the final model. The structural equation model (SEM), developed using AMOS 21, confirmed the fitness of the proposed model. The results of multiple regression analysis indicated that teachers' backgrounds, perceived usefulness, and attitudes toward GeoGebra significantly positively influence its adoption, with $p < 0.001$). Additionally, simple linear regression demonstrated that teachers' backgrounds directly affect perceived usefulness and attitudes toward using GeoGebra. Furthermore, perceived usefulness was shown to influence teachers' attitudes toward GeoGebra adoption ($p < 0.001$). To deepen our understanding

of how perceived ease of use correlates with teachers' backgrounds, perceived usefulness, and attitudes, Interpretative Phenomenological Analysis (IPA) was used, revealing that all four variables influence the adoption and actual use of GeoGebra. Recommendations include offering tailored professional development, mentorship programs, and integrating GeoGebra into the curriculum to facilitate its widespread adoption among teachers.

Key Words: Adoption and actual use of technology, GeoGebra, teacher background, attitude, perception toward GeoGebra

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18. Psycho-Social Determinants of Female Participation in Sports among Trainees in Teacher Training Colleges in Kenya

Juliana Andisi, Peter Bukhala, Roselyne Odiango

julianaandisi93@gmail.com *pbukhala@mmust.ac.ke* *rodiango@mmust.ac.ke*

Abstract

The under-representation of women in sports in Kenya has been documented by researchers, with lower levels of participation evident in various studies. Despite this, there is a lack of research specifically addressing the psycho-social factors influencing female sports participation among teacher trainees in Kenya. Objectives: The main objective of the study was to investigate, the intrinsic motivation of female participation in sports among trainees in teacher training colleges in Kenya. The specific objective was to: (a) determine demographics characteristics, (b) the types of sports and evaluate intrinsic motivational factors of the study participants in teacher training colleges in Kenya. The study was guided by Socio-ecological Theory. Methodology: this study used a cross sectional study design. Study targeted 1 private and 19 public Teachers Training Colleges whose students qualified to participate in the 2024 national competition in Kenya. These colleges were organized into regions: the Rift Valley, Nyanza, Coast, Eastern, Western, Central and Nairobi. A cross-sectional survey research design was used to carry out the study. The study target population was 672 female participants, whereas the sample size was 279, which was calculated using the sample determination table by Adam's (2020). Structured questionnaires were administered to the respondents with the assistance of trained research assistants. Data analysis: SPSS version 25 was used to compute descriptive statistics and bi-variate linear regression was employed to calculate the statistical significance. Results: data analysis demonstrated that that the majority (71.6%) of respondents fall within the age range of seventeen to twenty-three (17 to 23) years. This is followed by the age group of 24 to 29 years, which constitutes 23.3% of the respondents. Majority 211 (97.0%) of the respondents were affiliated to public institutions, while a small minority 21 (3.0%) were from private institutions. Volleyball (28.0%), Netball (21.8%), Handball (14.9%), Soccer (13.8%), and Hockey (11.1%). A majority (26.4%) of the respondents completely agreed that they were intrinsically motivated to participate in sport (mean=5.1; standard deviation=1.15). The study established that intrinsic motivation (S.D. =1.64) were statistically associated with female participation in sports at P=0.000. Recommendations: this study

recommended that Teacher Training Colleges should introduce and promote a wider variety of sports in order to accommodate different interests, develop new sports programs and expanding the existing ones. The study also recommended that Teacher Training Colleges should implement programs that address motivational factors through workshops and seminars in addressing personal benefits of sports participation.

Key words: Psycho-Social, Female, Sports, Teacher Training Colleges

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19. Exploring the barriers to effective implementation of multimedia-supported flipped classroom approach in organic chemistry in selected secondary schools of Rwanda

Ezechiel Nsabayezu, Olivier Habimana, Wenceslas Nzabalirwa, Francois Niyongabo Niyonzima

ezechielnsabayezu19@gmail.com hakilivier10@gmail.com wemcislasn20@yahoo.fr nijnofra13@yahoo.com

Abstract

This study investigates the barriers to effectively implementing a multimedia-supported flipped classroom approach to teaching organic chemistry in Rwandan secondary schools. Despite the potential for this approach to instruction to increase student engagement and understanding, a number of barriers have hindered its widespread implementation. 73 students in the fifth year of the upper secondary level (Senior Five students) and two chemistry teachers participated in the study, which used an explanatory sequential research design. A Likert scale questionnaire was used to collect quantitative data, which was then analyzed using statistical package for the social sciences (SPSS). Qualitative data from structured interviews were analyzed thematically. The quantitative data indicate that 65% of students had challenges with reliable internet connection, 58% experienced a lack of technology devices and 72% had insufficient digital abilities. Inferential analysis revealed a significant association between these barriers and students' capacity to participate with the flipped classroom method ($p < 0.05$). Furthermore, qualitative research indicated instructors' concerns about insufficient training and a lack of technical support. These obstacles limit the flipped classroom model's ability to improve learning outcomes in organic chemistry. To address these constraints and improve the success of multimedia-supported flipped classroom techniques in Rwandan secondary schools, the study suggests increasing investment in digital infrastructure, improving teacher training programs on digital competences, and reinforcing support networks.

Key Words: Barriers, Flipped Classroom Approaches, Multimedia, Organic Chemistry

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20. Artificial Intelligence Driven Research and Development: Implications for Advancing STEM Education and Sustainable Solutions

Stephen K. Mbugua
stevenkmbugua@gmail.com

Abstract

Climate change, the depletion of resources, and inequality in education worldwide require quicker and more sustainable solutions. This paper discusses how AI can revolutionize research and development in STEM education for sustainability. It is intended to determine how AI can increase innovation and deliver solutions to real-world challenges. A literature review and case study approaches are used to examine the use of AI in enhancing personalized learning in STEM and the integration of sustainable practices. The study reveals that the application of artificial intelligence in a teaching-learning environment can improve performance through the use of intelligent tutoring systems and virtual labs and enhance research and development processes such as energy management and environmental conservation. However, there are issues, including technological disparity, ethical issues, and the need for specialized skills. The paper concludes that cross-sector collaboration and investment in AI infrastructure and training can help build the future of AI in education and sustainability. Solutions being proposed include creating ethical guidelines, ensuring the availability of AI technologies, and collaborating multi-disciplinary for AI-based solutions that can lead to a sustainable future.

Key Words:

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21. The Use of Game-Based Learning to enhance Algebra Mastery and Student Engagement through the Equation Explorer in Schools

Lilian Nyaranga, Catherine Muhonja Aurah, Emma Mitchell
lnyaranga@elimushop.com, aurahcatherine@gmail.com, Partner@inspireherstem.org

Abstracts

This study explores the effectiveness of the Equation Explorer, an innovative game-based learning tool designed to enhance student engagement and achievement in mathematics through interactive gameplay. The Equation Explorer incorporates a hands-on, learner-centered approach to teaching fundamental mathematics concepts, including algebra, addition, subtraction, multiplication, and division. Demonstration sessions were conducted in three schools in Nairobi and Nakuru, including a homeschool community, involving 14 mathematics teachers and 110 students aged 11-18 from both junior and high school levels. The research employed a mixed-methods approach, combining workshop-based teacher training, team-based student gameplay, and post-game surveys to gather feedback. Observations indicated that 80% of the students enjoyed the game, reporting increased motivation and critical thinking during gameplay. Teachers expressed

optimism about the toolâ€™s ability to foster active learning and creativity but noted challenges in integrating the game into traditional classroom settings, particularly due to large class sizes and time management constraints. Preliminary findings suggest the Equation Explorer promotes student enthusiasm and collaborative problem-solving, although the game may be better suited for smaller group settings like math clubs. These insights offer a foundation for future research into scaling game-based learning in Kenyan classrooms and exploring the development of digital versions of the game to improve accessibility and classroom integration.

Key Words: Game-Based Learning, Student Engagement, Collaborative Learning, Critical Thinking

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22. Assessment of Utilisation of Computer Technology Tools in Teaching and Learning English Vocabulary in Grade Three in Primary Schools in Nyamira County, Kenya.

Benard Nyasimi

nyasiminyangau@gmail.com

Abstract

The use of computer technology in language education has become increasingly recognised as valuable tool for improving the quality of teaching and learning of English language. However, little research has been done to establish the extent of incorporation of computer technology tools in English vocabulary instruction in primary schools in Kenya. Studies have indicated that learners in primary schools in Kenya demonstrate low levels of vocabulary competencies in English language. The purpose of this study was to assess the utilisation of computer technology tools in teaching and learning English vocabulary in grade three in primary schools in Nyamira

County, Kenya. The study adopted mixed methods research design which combines both qualitative and quantitative techniques. The sample size consisted of 62 grade three teachers of English and 23 Curriculum Support Officers (CSOs). Stratified simple random and purposive sampling techniques were used to obtain a representative sample of the respondents. Data collection instruments included questionnaire, lesson observation and interview schedules. Validity of the research instruments was determined through expert judgment whereas their reliability was established through test-retest technique and Cronbach s alpha method was used to determine reliability coefficient. Qualitative data was analysed using content analysis whereas quantitative data was analysed using descriptive statistics with the aid of Statistical Package for Social Sciences (SPSS). The findings reported minimal use of computer technology tools by teachers in vocabulary lessons. Based on the findings, the study recommends adequate training of teachers in technology pedagogical use for optimal utilisation of computer technology tools in teaching to improve the quality of learning outcomes in English language and vocabulary in particular among learners.

Key Words: Gender Bias, STEM Education, AI Games, Gender Parity, Early Childhood Education

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23. The Challenges Encountered During the Selection and Utilization of Instructional Media for Teaching Kiswahili in Public Secondary Schools in Vihiga County, Kenya

Ayoti Caroline, Moses Poipoi

cayoti@mmust.ac.ke

Abstract

Utilization of instructional media plays a significant role in the attainment of educational objectives and the academic performance of students. The teaching and learning process of Kiswahili has been a challenge at secondary school level. This has contributed to dismal academic performance in the subject in KCSE exams. This calls for early intervention through use of a variety of instructional media to enhance high levels of retention of information. Therefore, the study purposed to establish the challenges encountered during the selection and utilization of instructional media for teaching Kiswahili in public secondary schools in Vihiga County. It adopted descriptive survey and correlational research designs. Purposive and stratified random sampling techniques were engaged to select 294 teachers and 13 Principals, selected from 42 public secondary schools in the county. A questionnaire was employed to collect data from teachers while data from principals was collected through interview schedule. The instruments were piloted in two schools to establish their validity by use of split half method. The data obtained was subjected to Pearsons Correlation Coefficient (r) where = 0.76. Qualitative data was analyzed thematically based on objectives and presented in narration form. Analysis of quantitative data was done using frequencies, percentages and regression analysis. Presentation of the findings was done through frequency distribution tables and textual presentation. The findings of the study exposed acute shortage of instructional media in schools in Vihiga County. Teachers were unable to improvise alternative media for use. They rarely participated in decision making on matters pertaining selection of instructional media, yet they had appropriate knowledge of the requirements for instruction. Generally secondary schools encounter several challenges preventing them from providing relevant media to teachers for use. Therefore, the study concluded that several challenges are encountered during selection and utilization of instructional media for teaching Kiswahili. The study therefore recommends that to realize desirable students' performance in Kiswahili, the challenges encountered during the selection and utilization of instructional media should be minimized. The study findings are envisaged to guide policy makers in formulation of policies that would ensure appropriate selection and utilization of instructional media in secondary schools.

Key Words: Challenges, Instructional resources, Students Performance

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24. Assessment of the Attitude of Secondary School Students Towards Physical Activity Participation in Kakamega County, Kenya.

Joseph Muchiri Ndunda, Edwin Wamukoya, Roselyne Odiango

josephndunda207@gmail.com,ewamukoya@mmust.ac.ke, rodiango@mmust.ac.ke

Abstract

Introduction: Physical activity is a key component in human development and growth, inadequate physical activity is associated with about two million deaths yearly. Eighty-one percent of the students do not meet the recommendations requirement of moderate to vigorous (MVA) physical activity levels. Objective: in order to understand this, the study was to: (a) determine the demographic characteristics of study participants, (b) assess the attitude towards physical activity participation and (c) evaluate gender differences in attitude towards physical activity participation among secondary school students in Kakamega County. Methods: The study used a descriptive survey design with a structured questionnaire with a sample size of 412 of students aged 14 to 18 years. Results: Males were 194 (47.1%) while female were 218 (52.9%) Majority of the students were 17 years of age and also majority were from Kakamega High School (31.0%). The data was collected, coded, and analyzed through descriptive statistics. Pearson product correlation was used to check the relationship between attitude and physical activity participation and independent t-test was used to check gender differences in attitude towards physical activity . Findings were considered significant at $p<0.05$. From the study findings, 75.8% had a positive attitude toward physical activity. There was positive and significant ($r=.178$, $p<0.001$) between knowledge and physical activity. There were no significant differences ($t(438) = -0.373$, $p=0.709$) between scores for males ($M=2.76$, $SD=0.691$) and females ($M=2.73$, $SD=0.687$). With mean difference of $r=0.025$, 95% CI: -0.105 to 0.154). Conclusion and recommendation: The study concluded that, majority of the students had positive attitude towards physical activity and positive attitude towards physical activity results into increased level of physical activity. However, the study recommends more awareness campaigns to promote the benefits of physical activity among secondary school students.

Key Words: Attitude, Physical activity participation, Kakamega

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25. Influence of Teachers Motivation on Academic Performance of Students with Learning Difficulties in Secondary Schools in Kakamega North Sub-County.

Jacob Shango Korofia, Esther Nyabuto, Stella Kabesa

jakorofia@gmail.com, esthernyabuto@gmail.com, stellarkabs@gmail.com

Abstract

Teacher motivation is an essential component of learning as it enhances the learning process thus ultimately influencing students' academic performance. The academic performance of students can be regarded as interplay between the teaching and learning processes. Furthermore, students' performance is closely associated with teachers' motivation. Teachers' motivation is pivotal in enhancing classroom excellence that is generally measured through students' attainment of the learning outcomes. However, the academic performance of students with learning difficulties has been a pertinent issue in the education circle. This group of learners have continued to show a low or below average performance which can be attributed to poor instructional strategies occasioned by insufficient motivational strategies for teachers. The purpose of this study was to determine the influence of teachers' motivation on academic performance of students with learning difficulties in secondary schools in Kakamega North Sub County. In order to achieve the objectives of this study, a descriptive survey design was adopted. The population of study was drawn from 220 teachers in the 50 registered public secondary schools in Kakamega North Sub County. A sample of 44 schools was selected using stratified random sampling method. Yamane's formulae were used to determine the sample for this study. This study was guided by Herzberg's two factors and McClelland achievement theories. Both structured and unstructured questionnaire was used to collect quantitative data whereas qualitative data was collected by use of structured interview schedules. Descriptive statistics through computation of mean, percentages and standard deviation was used to analyze the data collected. Multiple regression analysis together with Pearson correlation was used to ascertain the influence of teachers' motivation on academic performance of students with learning difficulties. A five-stage framework analysis approach was used to analyze qualitative data. The study established that in-service training for teachers had statistically significant moderate positive influence on academic performance of students with learning difficulties $F(1,101=26.503;p<0.05)$ and $(R2=0.208;p<0.05)$.The study also revealed that teachers work load had significance statistical influence on academic performance of students with learning difficulties $F(1,101)=8.052,,P<0.05$ and $R2=0.074;p<0.05$.It was also established from this study that teachers institutional work environment had a significant statistical influence on academic performance $F(1,101)=36.782;p<0.05$ and $R2=0.267,p<0.05$.However,the three variables taken together did not significantly influence the academic performance of students with learning difficulties. This study concluded that all the three predictors of teacher motivation have clearly demonstrated that there is a significant influence of teachers' motivation on academic performance of students with learning difficulties in Kakamega north sub county .Therefore the study recommends that there is need for teachers to have an access to regular ,effective ,well packaged and designed in-service training .Furthermore, the school administrators and other relevant stakeholders should promote favorable institutional work environment for teachers in order to enhance their productivity .The ministry of education through relevant agencies should ensure that teachers workload remain within manageable limits to enhance teachers' individualized attention to students with learning difficulties.

Key Words: Teacher motivation, Learning difficulties, Academic performance

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26. Psychosocial Stress and Adjustment during Covid 19 Pandemic Period In Kakamega Central Subcounty, Kenya

Lumiti Samuel , Moses Poipoi , Rose Opiyo

lumitisamuel@gmail.com, mosespoipo@mmust.ac.ke, ropiyo@mmust.ac.ke

Abstract

Psychosocial stress resulting from Covid-19 and psychosocial adjustment to the pandemic had a great impact on the job performance of teachers in secondary schools. The stress caused psychological and social changes in teaching and learning activities in secondary schools. According to WHO report 2020, the fast-spreading infectious disease has been causing universal awareness, anxiety and distress, all of which are natural psychological responses to the randomly changing condition. The objective of the study was to determine the psychological effects of Covid-19 related stress on job performance of teachers. The study was guided by social cognitive theory. Mixed methods research approach was used involving three specific designs: descriptive survey, ex-post facto and correlational research designs. Target population consisted of 429 teachers, 24 principals, and 1 Sub-County director of education. Stratified random sampling technique was used to select 7 principals and 228 teachers from 24 public secondary schools in Kakamega Central Sub-County. Research instruments included questionnaire and interview schedule. To cater for face, content and construct validity, the instruments were examined the researcher followed by supervisors in the department of educational psychology, Masinde Muliro University of Science and Technology before piloting. Pilot study was conducted in two sampled secondary schools to ascertain validity and reliability of the instruments. Reliability coefficient was determined at Cronbach's alpha was 0.845, which indicates that the reliability test for the questionnaire was good for our scale. Data analysis was done with the help of descriptive and inferential statistics using SPSS program. Anova was used to analyze effects while regression was used to analyze relationships. Quantitative data was keyed into SPSS for analysis. The descriptive analysis of the findings indicate that psychological factors affected teachers job performance. From the inferential analysis, the results of the study indicated that psychological effects of Covid-19 had a substantial impact on Job performance. From the findings at 5% level of significance, psychological effect ($p=0.0.001 < 0.05$) was significant predictors of job performance of teachers. Schools should take into consideration the psychological factors which affect job performance of teachers to mitigate their effect on adjustment to improve job performance during pandemics.

Key Words: Psychosocial Stress, Job performance, Covid 19, Psychosocial Adjustment

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27. East African HEI Network for Regional Digital Plant Pathology Study Modules

Sylvester Anami, Ann Indeche, Kristiina Himanen, Shawn C Kefauver, Shahasi Y Athman, Arthur K Tugume, Robert Amayo, Norah A Ebukalin, Douglas Miano, Luseko A Chilagane, Catherine Taracha

sanami@jkuat.ac.ke, annah.indeche@jkuat.ac.ke, kristiina.himanen@helsinki.fi, sckefauver@gmail.com, shahasi.athman@mak.ac.ug, arthur.tugume@mak.ac.ug, rob.amayo@gmail.com, dmiano@uonbi.ac.ke chilagane@sua.ac.tz, tarachac@gmail.com

Abstract

The impact of plant pathogens and the diseases they cause account for over 60% food insecurity in sub-Saharan Africa. Eastern African region is especially known as hotspot for evolution and emergence of highly virulent plant viruses and other pathogens that cause devastating plant disease epidemics across Africa. Accordingly, the increasing mean temperatures due to climate change continue to enhance the prevalence of pathogens and diseases they cause. Since partner higher education institutions (HEIs) in Kenya, Tanzania and Uganda operate at cradle of many plant pathogens in African agriculture, modernisation of higher education in the fields of plant pathology and virology is urgently needed. Great progress has been made in disease detection, identification and management. However, novel technologies have emerged in multiple fronts, including high throughput sequencing, bioinformatics, wet lab detection and their translation to field conditions. Furthermore, promising developments in image-based technologies provide fast non-destructive analysis, and machine learning approaches facilitate the accessibility of these technologies to the level of mobile apps. By employing these developments, this project aims at modernising existing plant pathology study programmes at partner HEIs by promoting uptake of image-based digital technologies for detection and identification of plant pathogens and disease diagnosis, coupled with cloud-assisted Artificial Intelligence. The digitization is relevant to the whole chain, from fields to laboratories, thereby making the digital transformation in plant pathology as comprehensive and inclusive as possible. In addition to the novel technologies, university pedagogy methods will be introduced to facilitate learning. Among the partner countries, a total of 300 students will benefit from the capacity building, and 60 faculty will receive training in university pedagogy and soft skills. Ultimately, the established East African HEI network will join forces to introduce three modernised Regional Digital Plant Pathology Study Modules for 1) University Pedagogy, 2) Imaging Technologies and 3) Plant Pathology. The study modules will be incorporated in the existing curriculum in partner HEIs for student credits.

Key Words: Viral, Plant Pathology, Pedagogy, Artificial intelligence

28. STEM Academic Program Type & Graduate Unemployment Duration: Reviewing the Graduates of National Polytechnics in Kenya

Wilberforce Jahonga, Consolata Ngala, Geoffrey Musera
wmjahonga@gmail.com, cngala@mmust.ac.ke, gmusera@mmust.ac.ke

Abstract

Despite the emphasis on STEM education as a driver of economic growth, concerns persist about the alignment between STEM academic programs in Kenya's national polytechnics and the labour market outcomes of graduates. This paper explores the job search duration of graduates given the nature of course. The research targeted the 2016 cohort of selected national polytechnic graduates, 11 registrars, and 11 office of careers services coordinators. Stratified simple random sampling, and purposive sampling techniques were used to get the sample population. A sample size of 1834 respondents was sampled from a target population of 21151. The Cox regression was used to analyze the hazard rates of graduates of national polytechnics in Kenya. Findings showed that a graduate of a modular programs had a median time to employment of 34.95 months (95% CI: 33.2025 -36.6975) while the non-modular programs was 49.93 months ((95% CI: 47. 43-52.43). Males exhibited a 15% higher hazard of experiencing employment than females (HR = 1.15, p = 0.047 < 0.05), indicating a gender-based disparity. Those who applied for a job in the last 8 weeks of the study had a 12.9% higher hazard of experiencing employment (HR = 1.129, p = 0.000 <0.05). A high job search intensity resulted in a 22.3% higher hazard of experiencing employment (HR= 1.223, p = 0.015 < 0.05). Course duration had a 2.8% higher hazard of experiencing employment for every additional year. Reservation wage showed a very slight but significant increase of 0.0015% in the hazard rate for each unit increase in the reservation wage (p = 0.000). Conversely, certain factors were associated with decreased risk: those who pursued non-modular program had a 16% lower hazard (HR = 0.83, p = 0.028 < 0.05) compared with those who pursued modular programs. Those who migrated from rural-to-rural areas had a 53.7% lower hazard compared with those who did not move but lived in urban areas (HR= 0.463, p = 0.40 > 0.05). The article concludes that modular programs lead to faster employment than non-modular ones. Males had a higher chance of getting jobs than females. Higher job search intensity and recent job applications improve employment chances while longer courses also help. Rural-rural migration does not significantly boost employment prospects compared to rural- urban migration.

Key Words: Non-Modular Programs, Modular Programs, Unemployment Duration, survival Analysis, Cox Regression

29. A Morphological Analysis of Abbreviated Neologisms of Social Media Discourses: A Case of Kenyans on X

Rebin Obwang'I, David Barasa, Robinson Oduma

rebinbuyaki@gmail.com, *davidbarasa@mmust.ac.ke*, *roduma@mmust.ac.ke*

Abstract

In recent years, the rise of social media platforms has dramatically transformed communication patterns and language use across the globe. Among these platforms, X (formerly known as Twitter) stands out as one of the most influential, having witnessed the emergence and widespread adoption of abbreviated neologisms. This paper presents a morphological analysis of abbreviated neologisms used by Kenyans on X. The objective was to analyze these abbreviated neologisms within social media discourses using the natural morphology framework (NMT) propounded by Dressler (1985). NMT is a functionalist theory that accounts for morphological preferences based on extra-linguistic motivations. Data for the study was purposively collected from the group christened Kenyans on X. The abbreviated neologisms were identified, and their meanings determined through contextual analysis. The data was then classified based on the morphological structure of the neologisms, including the type of abbreviation, the source words or roots, and other morphemes. This classification provided insights into the patterns and trends of using abbreviated neologisms on X. The findings reveal significant insights into the morphological features of abbreviated neologisms, shedding light on the innovative linguistic practices employed by Kenyan X users. The study highlights the role of social media platforms in language evolution, demonstrating how technology influences word formation processes. These findings underscore the broader understanding of language variation and change facilitated by social media platforms. The abbreviated neologisms are formed through initialisms, clipping and contraction.

Key Words: Abbreviated neologisms, netspeak, cross-linguistic diversity, indexicality, lect.

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30. Stem Curricula in Kenya, Is it Sustainable?

Eric Temba, Janet Kituyi, Catherine Aurah

tembae7@gmail.com, *janetkituyi@gmail.com*, *cmusalagani@mmust.ac.ke*

Abstract

STEM is an acronym for Science, Technology, Engineering and Mathematics education. It is an interdisciplinary approach to the teaching of sciences that should help students succeed in college and in their future careers. The main focus of STEM education is a hands-on, critical thinking and problem solving-based learning.

To keep abreast with the educational changes in the world and demands of the labour market, the government through the Ministry of Education has made changes in the curriculum with an emphasis on Science, Technology, Engineering and Mathematics (STEM). This is to ensure that students graduating from the secondary level of education possess the prerequisite competencies to enable them compete globally.

For a curriculum to have the element of sustainability, it should have the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs. Integrating sustainability in STEM curricula calls for continuous research to establish the current trends in global education and demands of the labour market. There should be political good will which affects the funding of education sector which is very essential for sustainability. Teacher education and in-service courses for teachers should be relevant to STEM education. The sensitization of parents should not be overlooked.

The purpose of the study was to determine if STEM curricula is sustainable. A desk research was performed to evaluate if STEM curricula is sustainable. This study examined secondary data from the internet and library to determine sustainability of STEM curricula in Kenya. The study documented different factors that may sustain STEM curricula. The study established that it was difficult to sustain STEM curricula. The major factors documented to be hindering sustainability of STEM curricula were; inadequate funding and research and lack of political good will.

Key Words: STEM, Curricula

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31. Effect Of Street and Non-Street Children's Characteristics on their schooling in Nakuru City, Kenya

Cyrus Muhanga

muhanga88@gmail.com

Abstract

Street children, just like all other children, are protected by both local and international law. The SDG goal number four provides for quality education for all. Basic education at elementary levels can be attributed to school attendance since it requires direct involvement of the teacher in shaping the intellectual progress of the learner. Many children in society, however, are dropping from school opting to live and work on the streets. This is blocking the attainment of United Nation's declaration on Education for All as well as the Kenyan government's policy on compulsory basic education. The purpose of this study was therefore to investigate the effect of street and non-street children's characteristics on their schooling in Nakuru city, Kenya. The objectives of the study were to estimate the effect of demographic characteristics of street and non-street children on schooling, to estimate the effect of family background factors of street and non-street children on schooling and to estimate the effect of location of origin for street and non-street children on schooling in Nakuru city. The study relied on the social cognitive theory of education. A comparative research design was employed in the study. The study was conducted in Nakuru city, within the central business district. A sample size of 278 street children was obtained from a population of 1,002

street children using Krejci & Morgan sample determination table. All the public primary and secondary schools within the town were targeted to get approximately 1000 non-street children to get a sample of 278 for comparison. Nakuru children's officers were interviewed to obtain the details on the street children in the town. Both purposive and snowball sampling techniques were used in identification of respondents. Questionnaires were used as the main instrument for data collection. Data was analyzed using descriptive statistics and logistic regression to test hypotheses. From the results, it was found that demographic factors such as gender, age and education level of the respondents are statistically significant in predicting the chances of going to the streets among children in Nakuru city. The results also suggested that family characteristics like parenthood, number of siblings in the family as well as the number of meals a day in the family were statistically significant in determining the chances of joining streets among children in Nakuru city. It was also established that location of origin among children in Nakuru city is important in determining the chances of ending up on the streets. It was concluded that age, gender, and level of education are important in determining the chances of schooling among children in Nakuru. Family characteristics such nature of parenthood was found to be the major determinant of schooling or non-schooling among the children. Families with a high number of siblings and low number meals per day, had higher chances of their children dropping out of school and joining streets. It was also concluded that children who come from rural areas had high chances of becoming street children compared to their urban areas' counterparts. Due to this, it's recommended that the government should develop and implement targeted educational support programs for the street children based on their specific needs and characteristics identified in the study. The government should also invest in school feeding programs to reduce the rate of dropout due to hunger at home among poor families, particularly in rural areas. Education financiers and other actors should design financial assistance programs or scholarships to alleviate the economic burden faced by families of non-street children.

Key Words: Street children, non-school children, and schooling

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32. Effect Of Teachers Achievement in Professional Knowledge and Practice Performance Contract Target on Pupils Academic Performance in Public Primary Schools Kakamega County, Kenya

Caroleen Murunga Saya, Judith Achoka, Jason Nganyi

caroleensaya@gmail.com, achokajudith@yahoo.com, jnganyi@mmust.ac.ke

Abstract

Globally, teachers performance appraisals are used for enhancing quality of education through provision quality learning experiences. For a long time, the teaching service in Kenya was under a closed performance appraisal system, where the school head appraised the teacher confidentially. In the year 2012, the Teachers Service Commission (TSC) launched the Performance Contract (PC)

policy in response to reports of failure of the Ministry of Education in meeting some of the targets outlined in the Kenya Education Sector Support Project (KESSP) of 2005-2010. The goal of PC was to enhance the quality of education offered to learners through strengthening supervision and continuously monitoring teacher performance at the institutional level. Performance Contracts in the teaching service is evaluated through regular teacher appraisals on their effectiveness, guided by predetermined set targets from the Teacher Professional and Development (TPAD) tool. Despite PC having been in place over last eleven years, its effect on pupil learning outcomes in Kakamega County Public primary schools is still not clear. The purpose of this study was to establish the effect of teachers achievement in professional knowledge and practice PC target on pupils academic achievement public primary schools in Kakamega County in Kenya. A Correlation research design with a mixed methods approach was adopted for the study. Eighty (80) schools were selected from 13 Sub Counties of Kakamega County using a multistage random selection sampling. Structured questionnaires were used to collect data on target achievement and learning outcomes from 2017 to 2023. Four key informants involved in PC appraisals (2 Curriculum Support Officers and 1 Sub County TSC Director and the County TSC Director) were purposefully selected and interviewed. The professional knowledge and practice PC target achievement and academic performance over the past six years (2018-2023) was established from schools. The quantitative data collected was analyzed using descriptive statistics and Pearsons correlation. Qualitative data was analysed thematically. There exists a very weak correlations between teachers professional knowledge and practice target achievement and learning outcomes of KCPE performance (r=.159; P= 0.7640), retention rates (r= 0.285; p=0.585) and completion rates (r=-0.079; p=0.061). However, the high p-values indicated non-significance, and therefore there isn't enough evidence to support meaningful associations. Thematic analysis of qualitative data showed that majority (78.1%) teachers had poor attitude towards the PC program and disagreed with the strategy of regular PC assessment. The key informants also revealed that the process of PC appraisal was not being taken seriously and had been seen as a routine procedure by teachers. The study concluded that the professional knowledge and practice target achievement had no effect on pupil learning outcomes in Public primary schools in Kakamega County. The study recommends that as TSC implements ongoing professional development programs, focus should be on pedagogical strategies with stimulus variation rather than just content knowledge. This would equip teachers with effective teaching methods that could positively impact student learning outcomes. There is need for further research to establish the relationship between specific aspects of teachers professional knowledge (e.g., subject-specific pedagogy) and student outcomes rather than relying solely on overall scores.

Key Words: Target achievement, Professional Knowledge, Performance contracts, Learning Outcomes

33. Exploring the opportunities and challenges of using web-based discussions tools in teaching organic chemistry in Rwandan secondary schools

Aloys Iyamuremye, Innocent Twagilimana, Francois Niyongabo Niyonzima
aloysiyamuremye@gmail.com, innocentk@gmail.com franiyonzima@gmail.com

Abstract

The integration of web-based discussion tools in education has gained attention for its potential to enhance learning, particularly in complex subjects like organic chemistry. This study explores the opportunities, challenges, and strategies to overcome identified challenges for the effective teaching organic chemistry through the use of web-based discussion tools in Rwandan secondary schools. The study purposively sampled 416 senior two and five students and their 14 teachers from Kamonyi and Gasabo districts in Rwanda. A mixed research approach was used to collect data from questionnaire and focus group discussion. Quantitative data were analyzed by using descriptive statistics while qualitative data were analyzed by thematic analysis. The results revealed that web-based discussion tools facilitate interactive and collaborative learning, offering students a space to discuss, engage, and critically analyze concepts. Additionally, it was found that use of web-based discussions tools allow students to review content at their own pace and improve their understanding of difficult topics. Furthermore, the finding highlighted that these tools are valuable for accessing diverse resources, leading to enhanced motivation and engagement. However, the identified challenges that impede the effective use of web-based discussion tools were limited access to technology, poor internet connectivity, insufficient teacher training, and lack digital literacy among students. To achieve this, the study highlighted the best strategies to overcome the identified challenges such as improving digital infrastructure, providing professional development for teachers, and designing user friendly interactive platforms, and promoting digital literacy among students. These findings provide critical insights for educators, policymakers, and stakeholders aiming to integrate digital tools into science education.

Key Words: Web-based discussion tools, opportunities, challenges, potential solutions, teaching and learning, and organic chemistry

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34. Mechanical properties of Al-Mg-Si alloys (6xxx series): A DFT based study

Kipkorir Pius, Maxwell Mageto, Nicholas Ongwen
kipkorirpius@yahoo.com, mmageto@mmust.ac.ke apache.nc.22@gmail.com

Abstract

Aluminum and its alloys are utilized in various purposes, including aircraft skin, cookware, building cladding, train carriages, and electrical lines. This is attributable to their advantages, which encompass low density (physical density of 2.7g/cm3, which is approximately a third that of steel), non-corrosivity, formability, good thermal and electrical conductivity, and availability. Moreover, its non-corrosivity diminishes with alloying. Several studies, mostly experimental, have

been done on aluminum-magnesium-silicon (Al-Mg-Si) alloys (6xxx series). Mechanical properties, especially strength and ductility, have been explored in those earlier studies. However, other mechanical properties such as bulk modulus, shear modulus, Young's modulus, Poisson's ratio, Pugh's ratio, creep, and resilience have not been explored extensively. While this study touched on ductility and hardness, it also explored the bulk modulus, shear modulus, Young's modulus, Poisson's ratio, Pugh's ratio, and yield strength of Al-Mg-Si alloys. The main objective of this study was to determine the alloy composition that could yield stronger, harder, and more ductile materials that are appropriate for both aerospace and automotive industries by making use of density functional theory (DFT) calculations. The modeling of the structures was done using an aluminum cell as the starting structure, whose crystallographic information file was downloaded from the Crystallography.net website. It was then transferred to Burai software, where the unit cell was visualized and then transformed into 3 × 3 × 3 supercells containing 108 atoms, after which the supercells were alloyed with the appropriate number of Mg and Si atoms. Nine structures of Al-Mg-Si alloys with different percentages of Al, Mg, and Si were investigated. Structural optimization of the alloyed supercells was done as a preliminary to the study. The variable-cell relaxation was done using the Brodyden-Fletcher-Goldfarb-Shanno (BFGS) algorithm. The stress-strain method was employed in the calculation of elastic stiffness constants, from which mechanical properties were obtained. The elastic constants were calculated using Density Functional Theory (DFT) with the Perdew-Burke-Ernzerhof for Solids (PBESOL) functional, as implemented in the Quantum Espresso software. This work has conclusively demonstrated that the Si/Mg ratio is a pivotal determinant of the mechanical properties of Al-Mg-Si alloys. The optimal parameters identified in this study include a density of 2762 kg/m^3, a bulk modulus of 83.3 GPa, a shear modulus of 34.4 GPa, a Vickers hardness of 2.79 GPa, a Poisson's ratio of 0.413, a Pugh's ratio of 5.42, and a yield strength of 8.38 GPa. The ideal Si/Mg ratio for the majority of characteristics is 4.5. The alloys exhibiting these optimal features are suitable for industrial applications that necessitate such characteristics, including aircraft skins and mining equipment, particularly those with maximum hardness and yield strength. Their superior ductility enables their application in the fabrication of motor vehicle components and rail carriages. The alloys' low density renders them appropriate for manufacturing airplane components, as they enhance load capacity by minimizing part weight.

Key Words: DFT, Al-Mg-Si alloys, mechanical properties

35. Harnessing AI- Driven Research and Development for Advancing STEM Education and Sustainable Solutions

Ambassador Dr. Christine Obaigwa Owinyi, Ph.D.

Abstract

Artificial intelligence (AI), known as a game changer, is becoming a transformative force in research and development (R&D), particularly it is making strides in STEM (Science, Technology, Engineering and Mathematics) education. This study delves into the impact of AI powered R&D, on fostering disciplinary teamwork, boosting creativity and improving teaching approaches. Incorporating AI into STEM courses empowers students to hone the competencies needed to address sustainability issues. In years technological advancements in education such as learning systems driven by AI and adaptive teaching platforms have shown promise in enhancing learning outcomes and nurturing creativity in Science Technology Engineering and Mathematics (STEM) fields. This study leverages qualitative observations and numerical data to assess the impact of AI in propelling progress in STEM education and sustainability initiatives while also delving into concerns like safeguard of data privacy and ensuring fairness, in accessing AI tools impartially. Drawing from real life examples and successful strategies outlined in the document showcases how artificial intelligence (AI) can be utilized to integrate STEM education with the Sustainable Development Goals (SDGs) specifically emphasizing the focus on quality education (SDGs 4) and efforts towards addressing climate change (SDGs 13) (Owinyi, 2024). Ultimately AI plays a role in preparing students, with the abilities to pioneer lasting solutions to intricate worldwide issues.

Key Words: Artificial Intelligence. STEM education, Personalized Learning, Sustainability, AI ethics, Sustainable Development Goals, Adaptive Systems, Education Technology.

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36. Factors Influencing Nurse Interns' Competence in Physical Assessment for Adult Patients

Nelly Kiplagat

nellykiplagat02@gmail.com

Abstract

Physical assessment is essential to the overall health assessment, constituting the nursing process's first phase. Physical assessment competence of nurse interns has been observed as insufficient in evaluating and solving patients' health problems. This has negatively

influenced their ability to make better clinical decisions, thus contributing to poor quality of patient care. The study aimed to investigate factors influencing nurse interns' competence in physical assessment for adult patients. Cross-sectional analytical research design guided the conduct of the study and the sample comprised 117 interns. Data collection was done using a self-administered questionnaire and observation checklist. The study was done in level 5 â€“ 6 referral hospitals in Western region of Kenya. The study revealed that 35% (n=41) of nurse interns were competent in physical assessment with a score of â‰¥90% in physical assessment skills, while 65% (n=76) were not competent. Factors statistically associated with higher competence scores (â‰¥ 90%) included year of completion between 2016 â€“ 2019 (OR: 3.1; 95% CI [1.1-8.5]; p=0.02), internship period between 9â€“12 months (OR: 0.2; 95% CI [0.1-0.5]; p=0.0002), previous clinical experience before internship (OR: 0.4; 95% CI [0.2-1.0]; p=0.05), self-confidence (OR: 4.5; 95% CI [1.9-10.5]; p=0.003) and motivation (OR: 0.4; 95% CI [0.2-1.0]; p= 0.042). In conclusion, nurse interns' competence in physical assessment is low, as shown by around one third of interns achieving a score of â‰¥90%. Factors influencing physical assessment competence include year of completion, longer internship period, previous clinical experience before internship, self-confidence and motivation. The study recommends that nurse training institutions emphasize theoretical and practical sessions of physical assessment skills to enhance student nursesâ€™ competence before internship. This information will enable the nurse managers, educators and training institutions to develop appropriate strategies that enhance physical assessment competence of nurse interns.

Key Words: Competence, physical assessment, factors influencing, internship, nurse interns

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37. The Effect of Sunflower Oil and Water on Thermal Storage Parameters of a Flat Plate Solar Water Heating Collector

David Osiyo Ng'anga, Maxwell Mageto, Hussein Golicha, Francis Gaitho

david.osiyo@gmail.com, mmageto@mmust.ac.ke, hgolicha@mmust.ac.ke, fgaitho@mmust.ac.ke

Abstract

Solar thermal energy conversion by flat solar collectors can be used for water heating to a temperature of 80â„f. However, the thermal performance of these solar collectors is very much affected by varying weather conditions. Heat retention can effectively be achieved by the use of thermal storage fluids like sunflower oil. The aim of the study is to assess the effects of sunflower oil and water on the thermal storage capacity parameters of a flat plate solar water heater. Specific

objectives were to determine the effect of water and sunflower oil on the peak output temperature heat removal factor, heat loss coefficient, and efficiency of the flat plate solar water heating systems. Flat plate solar water heating collectors containing sunflower oil, and water as thermal storage fluids were designed and constructed for this study. The absorber plate was made of mild steel welded on galvanized iron riser pipes. The temperatures were measured using k-type thermocouples connected to a data logger and a computer. Simulation and theoretical modeling were done using KOLEKTOR 2.2 software while experimental data computation and analysis were done using MATLAB. Research findings showed that sunflower oil and air attained a peak temperature of 75â„ƒ, while that of water was 65â„ƒ from 12 noon to 3.30 pm. Sunflower oil has the longest stagnation (steady) temperature duration. Both experimental and theoretical results showed that sunflower oil has a higher removal factor FR and efficiency factor F1 than water. From the KOLEKTOR model, efficiency factor F1 values of sunflower oil, water and air 0.922, 0.916 and 0.818 respectively. Sunflower oil is also a better thermal storage fluid than water since has a lower heat loss coefficient than water. The information from this study would be useful for effective utilization of intermittent solar energy for heating applications. Thus reducing water heating expenses, and conserving our environment.

Key Words: Solar water heating, thermal storage medium, solar energy, heat loss, efficiency

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38. Distribution of Plasmodium Species and Effect of Time Trend on Malaria Prevalence in Mbale Township, Western Kenya

Beatrice Muzame, Elizabeth Omukunda, Patrick Okoth, David Mulama

beatricemuzame77@gmail.com, omukundaelizabeth@gmail.com, okothpatrick@mmust.ac.ke, dmulama@gmail.com

Abstract

Malaria is the leading cause of mortality and morbidity in Sub Saharan Africa. Various intensive control strategies and measures have been put in place to reduce and ultimately eradicate malaria but it still exists at disproportionately high levels in many regions of Kenya. The study in Mbale town and its environs was carried out at Mbale Provincial Rural Training Health Center in Vihiga County, Western Kenya from December 2019 to November 2020. The study assessed distribution of Plasmodium species in relation to geographical locations (Wards), age and gender in the study area. The study also identified malaria prevalence patterns in relation to time trends using data from the hospital used. Blood films were prepared and observed under microscopes to identify various Plasmodium species. Among patients who presented themselves at Mbale Provincial Rural Training health center for different medical issues, 768 malaria confirmed patients were purposively recruited and signed consent before the study commenced. The recruited malaria patients were stratified according to demographic status and their residence (wards) using structured questionnaire. Data was analyzed using SPSS software version 17. Descriptive and

inferential statistics were used to compare variables in the study population. In all tests p-value â‰¤ 0.05 was considered statistically significant. Out of 768 malaria patients recruited, 98.7% recorded P. falciparum positive, while P. ovale, P. malariae and P. vivax accounted for 1.3%. Unlike the other two wards, Edzava ward recorded all the four Plasmodium species. Lugaga/Wamuluma ward which had more mosquito breeding grounds than the other two wards recorded the highest malaria prevalence. Male malaria patients accounted for 49.3% recording all Plasmodium species while female constituted 51.7% without Plasmodium ovale. All age groups were diagnosed with P. falciparum while P. malariae and P. ovale were missing among 14-18 years old age group. Children below 5 years old were not diagnosed with P. ovale. Multinomial regression analysis showed effect of wards, age and gender to malaria prevalence was ([F (3,764) = 1.854], p < 0.136). Residence (wards) according to multinomial regression (p-value = 0.034) and Chi-Square p-value = 0.036) were statistically significant to malaria prevalence as opposed to gender (Chi-square p-value = 0.339) and age (Chi-square p-value = 0.669). Multiple linear regression analysis showed effect of time trend on malaria prevalence was ([F (3, 8) = 2.976], p < 0.097). Months however had a statistically significant effect on malaria prevalence (p-value = 0.036) as opposed to rainfall and temperature. Correlation between average temperature and months were statistically significant (p-value = 0.013). Spatio-temporal variations and many mosquito breeding grounds influenced high malaria prevalence in the study area. Malaria control strategies should be strengthened in relation to space and time-trend at household level.

Key Words: Plasmodium species, malaria prevalence,space, demographic factors,time trend,,mosquito breeding grounds

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39. Efficiency of Pumice-Sand Granular Filter in Removing Effluent Wastes in Shirere Wastewater Treatment Plant in Kakamega County, Kenya

Otenyo Philip M., Masibayi Edsward N, Owino Isaac, Soiata Samwel , Otenyo Philip, Soita Samwel
otenyo.philip@gmail.com

Abstract

Release of effluent directly from Aerobic maturation ponds into natural water bodies without sufficient filtration has presented to be un optimal. Consequently, people down streams are exposed to greater risk of contracting waterborne diseases such as cholera, dysentery and typhoid. Skin problems, eye infections, and diarrhoea have all been linked to a lack of clean water and sanitation among community members. Introduction of filtering technologies such as sand, biochar, coconuts, pumice and crushed stone aggregates have been inadequate to treat the municipal waste water quality. Even then, no effort has been made to apply such technologies in the removal of wastes discharged into

River isiukhu from Shirere waste water oxidation ponds. As consequence, its waters have been shown to be increasingly getting covered by algae which indicate the presence of cynobacteria that is very toxic to human and animal health. Thus, the objective of this study was to determine the efficiency of the pumice-sand granular filter in removing wastes in Shirere wastewater treatment plant in Kakamega. The wastes were Nitrates, Phosphates, BOD, COD and TSS. This objective was assessed under varying filter depths, effluent flow rate into the filter and seasons. Research design was experimental method and data was analysed using SPSS software. For example, the average reduction of COD in the mid-season of June to August was 42.2 ±4.6%, being the highest. Concomitantly, BOD removal by the filter in the season of June to August was19.6±7% and 15.6 ±3.5% for September to November. This shows a trend of high efficiency in dry season of June to august and march to May followed by September to November. Conclusively, the use of composite filters in wastewater treatment reduced the organic matter intake, resulting in oxygen levels that were within natural values. Similarly, noted was good removal of COD a factor that led to levels that are within the NEMA standards. Findings of this study will influence waste water management policies and improve new technologies in waste water treatment for sustainable development. From the results, its therefore recommended that the composite filter technology should be applied to non-compliant sewerage treatment plants to boost the efficiency.

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40. Enhancing Secondary Mathematics Education in Kenya: A Review of Instructional Practices and Strategies for Improvement

Marble Nandwa, Beatrice Sikuku N., Kaleb Mwendwa
kwendwa@mmust.ac.ke

Abstract

Mathematics is crucial for scientific and technological advancements and socio-economic development. However, many students disengage from mathematics due to a lack of appreciation for its relevance. This review examines studies on instructional practices in secondary mathematics education in Kenya, highlighting challenges and proposing effective strategies. The review compares traditional teaching methods with innovative approaches, such as Behavioral Objective-Based (BOB) strategies, Peer Instruction with Concept Tests (PICT), and a combined BO-PICT method. Data were sourced from empirical studies and theoretical frameworks. Several challenges in current instructional practices were identified, including ineffective teaching methods, insufficient resources and technology, limited teacher training, and outdated curricula. Despite these challenges, several effective practices were highlighted. Inquiry-based learning, which encourages solving real-life problems, and collaborative learning, promoting teamwork and technology use, were particularly effective. Diverse assessment methods also provided comprehensive feedback and supported learning. The review found that innovative

instructional strategies significantly improve student performance. BOB, PICT, and BO-PICT methods led to better outcomes than traditional approaches. Students using Individualization for Mastery (IMA) and appropriate mathematical language (AML) performed better. There was a positive correlation between these practices and improved student attitudes towards mathematics. Activities that make math engaging, such as games and physical activities, increased student interest and participation. Based on these findings, the review recommends incorporating real-life and open-ended problems into the curriculum, enhancing teacher training to include modern strategies and technology integration, and providing adequate resources. Creating a positive classroom environment that fosters creativity, collaboration, and critical thinking is essential. This can significantly enhance student achievement and attitudes, creating a more engaging and effective learning environment.

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41. Interdisciplinary Approaches to Sustainable Solutions: Bridging Stem with Society Parental Role in Assisting Learners Acquire Entrepreneurial Skills

John Wenje, Robert Kati
johnwenje70@gmail.com, *rkati@kibu.ac.**ke***

Abstract

Competency Based Curriculum (CBC) requires learners to acquire essential skills that will assist learners in everyday life, in and outside school. Some of the skills are critical thinking, communication, problem solving and learning to learn. It is envisaged that these skills will help learners to be self-reliant even after schooling. This paper explores the intersection of social sciences and STEM education by examining ways in which parents assist lower primary school pupils in acquiring entrepreneurship skills at Early Years of Education (EYE) in an interdisciplinary approach to sustainable solutions, therefore bridging STEM with society. The study focused on how interdisciplinary approaches, particularly the integration of technology, science and innovation concepts, enhanced STEM learning outcomes by embedding entrepreneurial thinking from an early age. The research investigated key strategies used by parents to impart entrepreneurship skills. These strategies included practical activities such as small-scale trading, resource management, and problem-solving in everyday contexts, which were crucial for fostering a mindset geared towards innovation and resilience. Studies indicated that, parents play a pivotal role in contextualizing STEM education by integrating social science concepts such as economics, cultural values, and community engagement, thereby making learning more relevant and impactful. The study underscores the importance of leveraging interdisciplinary approaches to equip young learners with skills that go beyond traditional academic boundaries, enabling them to navigate and contribute to their communities even in challenging circumstances. The study was informed by Systems theory. The study was conducted in three counties of Busia,

Bungoma and Trans Nzoia, Kenya. Stratified random sampling was used to select 681schools while purposive sampling obtained teachers, pupils and Parents' Association representatives (PAs). The sample of the study was 1,986 participants comprising 683 teachers, 1,115 grade 3 pupils and 188 PAs. The study adopted a descriptive survey design. Questionnaire was used to collect data from teachers, interview guide from parents and Observation schedule from pupils. The study found out that majority of parents were within a mean ranging between1.725 and 3.086 in the category of strongly disagree, Disagree and Undecided on indicating assistance to pupils in take home assignment. The respondents, did not confirm parental participation using the required ways of assisting pupils in their take home assignments in Entrepreneurship skills. The study recommends research to be conducted on the best ways of parental engagement in pupils learning within the constraints of scarce resources and applying interdisciplinary approaches for sustainable solutions to challenges facing society by embracing STEM education for future development.

Key Words: Entrepreneurship skills, interdisciplinary Approaches, Parental Participation

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42. Stakeholders' Characteristics Influencing the Implementation of Food Security Projects in Vihiga County, Kenya

Elizabeth Sisianoi K,Silvenus Konyole, Gordon Nguka

sisianoielizabeth26@gmail.com, *skonyole@mmust.ac.ke*, *gnguka@mmust.ac.ke*

Abstract

World food security will exist when all people have physical and economic access to safe, sufficient, and nutritious food all the time to meet their nutrient needs and preferred foods for optimal health. Approximately two billion of the eight billion people worldwide are food insecure. Food security mainly depends on the growth and distribution of nutritious foods. Food security has been a great challenge in Kenya due to natural hazards, conflict, and population growth. The general objective of this study was to determine Stakeholders' characteristics influencing the implementation of food security projects looking to identify the distribution of agriculture projects supported by stakeholders in Vihiga, assess how farmers' education levels influence food security projects, determine how land ownership affects the implementation of food security projects, and examine the performance of agricultural policy in the realization of food security in Vihiga County, Kenya. The study adopted a descriptive cross-sectional survey using mixed methods of data collection. Qualitative data were obtained from 30 purposively selected stakeholders through focus group discussion and key informant interview guides. The themes formed from the qualitative data were analysed manually, and verbatim quotes were used to explain the findings. Additionally, 273 structured questionnaires were administered to farmers to collect quantitative data. The results were analysed using Statistical Package for Social

Sciences (SPSS) version 26. The data revealed that the main agricultural project was the National Agricultural Rural Inclusive Growth Project (NARIGP), which majored in dairy, local chicken, banana, and vegetables. The findings from the farmers showed that 66.67 % were beneficiaries of these programs, 48% were supported by indigenous vegetables and 4% were engaged in dairy farming. Further, the study found that there was unequal program coverage at 55.7 %, indicating that program distribution was just to a minimal extent. 35.5% reported that the distribution was moderate, while 8.8% said programs were distributed to a great extent. Pearson's chi-square test indicated a strong relationship between education level and farmers' awareness of key agricultural programs (p-value of 0.000). There was a strong association between education level and farmers' knowledge of key program supporters (p-value of 0.003). Land ownership was a significant challenge from the findings, as 35.5% reported owning less than 0.5 acres of land. Moreover, although food and agriculture policies are in place, gaps exist in implementing and adhering to these policies. About 48.4% were unfamiliar with existing policies, with 36.6% agreeing that project outcomes could be better if policies were well implemented. It was revealed that budget allocation to the agriculture sector is at 2.4%, which is still a quarter way to the international commitment of 10%. This study recommends capacity building of farmers to support smart agriculture, using technological methods to increase productivity on small land. Additionally, stakeholders must create policy strategies, collaborate, and develop program distribution mechanisms to promote nutrition and agriculture projects and improve food security.

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43. Sports Teachers Competences in Preparation and Implementation Of Physical Education In The Selected Primary Schools In Iganga District.

Paul Opio, Edwin Wamukoya Kadima,

opiopaul1@gmail.com, ewamukoya@mmust.ac.ke

Abstract

This study about Sports Teachers Competences in Preparation and Implementation of Physical Education (P.E) in the Selected Primary Schools was carried out in Iganga District. The study adopted descriptive survey research design with both qualitative and quantitative research approaches. The total target population was 2706 with sample size of 338. The study used questionnaire, interview guide, Focus Group Discussion Guide, and observation checklist for collecting data. Data was analyzed using descriptive statistics using SPSS version 29(2022).Correlation findings showed positive significant associations between Sports Teachers Competences in preparation ($r = .731$, $p < 0.01$), and P.E implementation. Regression findings showed 53.5% variations for Sports teachers Competences in preparation on P.E implementation. The findings revealed that Sports

Teachers have inadequate competences in making P.E Schemes of work, lesson plans, Instructional materials (IMs), and lesson notes. It was noted that P.E was time tabled in very few schools and not seriously taught. Sports Teachers did not define the activity area and had inadequate knowledge on demarcation of sports fields. The study concludes that; Sports teachers have inadequate competences in making P.E Schemes of work, lesson plans, instructional Materials and lesson notes. P.E is time tabled in few schools. Sports Teachers lack the organizational skills of a P.E teacher. Sports Teachers don't define the activity area and sports facilities. Basing on the findings and conclusions, the study recommends that; Sports Teachers should be given capacity building courses (CPDs) on the teaching of P.E. In addition, there is need to strengthen support supervision and monitoring by the Head teachers and quality assurance officers to ensure Curriculum Implementation. The Ministry of Education and Sports should review the 2004 P.E and Sports Policy to ensure that P.E is made compulsory at all levels of education in addition to making it examinable at National Examinations. Sports Teachers should plot P.E on the school timetable and strictly implement it. The government should supply instructional materials (equipment) to all schools to facilitate the teaching of P.E. The training of teachers in Institutions should be strengthened to ensure that Sports teachers are well grounded in Physical Education.

Key Words: Sports Teachers, Preparations, Physical Education, Implementation, Competence, Primary Schools, Iganga, Instructional Materials.

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44. Effect of Sodium Carbonate Pretreatment and Pretreatment Duration on Total Solids of Maize Stalk: Response Surface Methodology Approach

Reuben Tum, Barasa Masinde, Peter Cherop

tumreuben@gmail.com, *hmbarasa@mmust.ac.ke*, *pcherop@mmust.ac.ke*

Abstract

Lignocellulosic material serves as a valuable yet impractical energy source, with maize stalk (MS) being one of the most prevalent lignocellulosic agricultural residues in Kenya. Lignocellulosic materials typically possess a high cellulose content, exhibiting a combustion energy of 15 kJ/g, which, upon conversion to methane, yields a combustion energy of 50 kJ/g. Lignin serves as the primary impediment to microbial activity on the cellulose and hemicellulose components of municipal solid waste. Biogas is produced from diverse lignocellulosic substrates via co-digestion, utilizing enzymatic hydrolysis of cellulose. The pretreatment of biomass is a critical process step aimed at enhancing its accessibility to enzymatic degradation, significantly influencing subsequent stages of the

process. The study sought to determine the impact of sodium carbonate as a pretreatment medium on the total solids of MS and to identify the optimal duration for pretreatment. To overcome the inhibitory barrier posed by lignin and improve the digestibility of MS, a surface response methodology (CCD) was employed to develop a design of experiment (DOE) for MS pretreatment. The MS underwent pretreatment with various concentrations of sodium carbonate for differing durations: 7% for 8 days, 3% for 4 days, 7% for 4 days, 5% for 6 days, 5% for 3 days, 2% for 6 days, 5% for 6 days, 5% for 6 days, 7.8% for 6 days, 5% for 8.8 days, 3% for 8 days, and 5% for 6 days. The alteration in total solids (TS) was the determinant of the improvement in MS digestibility. The optimum values for maximum total solids with the highest total solids of 15.15% were found to be sodium carbonate pretreatment at 7% for 4 days, representing a 7.26% increase in TS. The total solid was express as a function of operating variables. The model was significant ($P< 0.05$).

Key Words: Maize stalk, Pretreatment, sodium carbonate, CCD

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45. Study of Black Tea drying Process in Fluidized Bed Dryer Using Computational Fluid Dynamics

Bonface Otedo, Peter Cherop, Emmanuel Osore

bonnieotedo@gmail.com, *tumwet2@gmail.com*, *eosore@mmust.ac.ke*

Abstract

Study focuses on black tea drying process on fluidized bed dryer in tea factories The Box Behnken design under response surface design methodology in Minitab software was used to analyze and optimize the black tea drying variables. The optimum variables were found to be at hot air temperature of 373.15K, hot air velocity of 0.38 m/s and drying time of 12.9 minutes. These drying parameters resulted in a more acceptable black tea moisture content of 3.5% db which falls between the acceptable black tea moisture content of 3% db to 4% db. Tea drying variables considered in the study were air temperature, air velocity and time. Fluidized bed dryer was considered on this research work owing to its numerous merits in drying process. Tea drying process was simulated using ANSYS FLUENT software. Geometry meshing was taken to be 0.05m. Mesh interdependency test was leveraged on experimental air velocity of 0.38 m/s. Hence the resultant elements of 44800 and node 45241 landed with a 5.26 % error. Calculated minimum fluidization air velocity was 0.21 m/s to stabilize the simulation process. Drying simulation was governed by Eulerian â€“ Eulerian model. Initial drying air temperature was taken as 373.17K. dying simulation process was visualized by volume fraction contours with introduction of 373.15K drying air temperature at 0.21 m/s drying air velocity. Simulation air temperature was varied between 373.15K and 403.15K. It took 8 hours to complete the simulation process. Air temperature and air velocity obtained in simulation results were almost to

what the experimental results obtained using laboratory scale fluidized bed dryer Drying Sherwood Tornado model.

Key Words: Dhool, Drying, Tea, Moisture, Fluidized, Optimum.

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46. Preparing Future Scientists: Language Proficiency as a Foundation for STEM Communication

Josephine M. Maingi
maingi.jos12@gmail.com

Abstract

In a rapidly evolving global economy, STEM (Science, Technology, Engineering, and Mathematics) education is essential for innovation and sustainable development. However, in Kenya, while there has been a notable push towards enhancing STEM programs, the role of language proficiency in STEM success remains largely overlooked. This study, examines the link between language skills and STEM achievement in Kenya. The issue lies in students' limited ability to fully grasp and communicate complex STEM concepts due to insufficient language support, which impacts their readiness for STEM-driven careers. Guided by Vygotsky's Sociocultural Theory—which posits that language is central to learning and intellectual development—this research employs a mixed-methods design. Surveys and structured interviews will be used as data collection tools, targeting secondary students, STEM educators, and policymakers. These instruments will collect both quantitative and qualitative data on the challenges and benefits of integrating language proficiency into STEM learning. The expected outcomes of this study include demonstrating how language proficiency improves students' understanding, problem-solving abilities, and communication within STEM fields, supporting inclusive societal progress and sustainable development. The findings are expected to highlight that building students' language skills is essential for driving innovation and increasing accessibility to STEM education. The significance of this study is its potential to shape educational policy in Kenya by promoting the inclusion of language support within STEM programs, equipping students for STEM careers both locally and globally. This research underscores that for Kenya to develop well-rounded scientists and engineers, language proficiency must be recognized as an essential skill in STEM education and communication.

Keywords: STEM education, language proficiency, communication, foundational skill, sustainable development, societal advancement.

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47. **Covid-19 awareness, physical activity levels and balanced Dietary Intake Among adolescent with Disability in Kakamega County, Kenya.**

Dr. Roselyne Odiango[1]. Gordon Nguka[2]. & Edinah Sabiri Mogaka[3]
rodiango@mmust.ac.ke, rodiango@yahoo.com

Abstract

Persons with disabilities are at a greater risk of contracting COVID 19 due to a number of barriers and challenges they face or can develop a more severe case of COVID 19 if they become infected. Scanty research evidence exists in Kenya on COVID-19 awareness, physical activity levels and dietary intake during COVID-19 pandemic among adolescent with disabilities in Kenya. The study assessed (a) The demographic characteristics of the study Participants, (b) Evaluated the current status of COVID 19 awareness, Physical Activity levels and Optimum Dietary Intake among adolescents with disability in Kakamega County. **Methods and materials:** The study targeted 200 adolescence with disability in Kakamega county using census research design. study covered 12 sub-counties in Kakamega County. Sample population comprised of adolescents with physical, visual and intellectual disabilities aged ten (10) to twenty (20) years. G*power was used to calculate sample size to be included in the study. The study used the International Physical Activity Questionnaire—Short Form (IPAQ-SF), food diversity score, Kobo-connect was main tool of data collection. The study adhered to ethical considerations from the ethical review committee of the university. Data was cleaned, coded and organized appropriately using SPSS version 24.0ne way analysis of variance (one-way ANOVA), dependent t-test and regression analysis was used to determine statistical significance at 0.05. **Results:** The background results of the respondents revealed that majority of the respondents were male (n = 126, 62%) who were aged 13 – 15 years (n = 107, 53%) with a mean (±SD) of 14.30 (±2.45) years. Majority of the respondents were placed in special schools (n = 102, 50%) and were in the class referred to as foundation one (n = 36, 18%). All variables except class ($\chi 2(df=15) = 30.0$, $p=0.11$) were statistically significant and therefore the associations were not completely due to randomness. majority of adolescence with mental, Physical challenges and visual impairment were insufficiently physically active (MH=45.7, % PH=87.8% and VI=57.9%). Results also demonstrated that adolescents with disability were severely undernourished with 90% getting food from less than three food groups and below. **Conclusions:** The results therefore established a strong correlation between physical inactivity and undernutrion among adolescence with disability during Covid-19 pandemic. **Recommendations**: The study recommended a physical activity intervention and optimum dietary counselling and education programme to remedy the current impact of COVID 19 pandemic.

Key words: Covid-19. Physical Activity, Dietary intake, Adolescence, Disability.

48. The Role of Emoticons in the Teaching of English Language to Leverage STEM in Schools in Turkana County

Beatrice K.C Obwoge
bmbori@tuc.ac.ke

Abstract

English language is a medium of instruction that is used to teach academic subjects in upper primary school and beyond in Kenya. Subjects such as mathematics, science and technology rely on the learner's grasp of the language to perform well and excel in performance. It is therefore, a very significant subject in the classroom. It facilitates literacy. English as a medium of instruction broadens the minds of the learners in other learning areas. English orthography, grammar rules and intricacies of sentence structure such as verb and tenses can be very confusing and may pose challenges to the learners. Nonetheless teachers of English strive to lay solid foundation for every learner to master the rules of the language. The paper is hinged on Eckman's Markedness Differential Hypothesis. Eckman's Markedness Differential Hypothesis (EMDH of 1977, 1981 and 1985) stipulates that areas of L_2 which are different from L_1 and which are more marked will be difficult to acquire; the degree of difficulty depends on the degree of markedness of the areas in question. According to Eckman (1985) children….have a fixed order in which they acquire linguistic features when learning L_2.Learners in Turkana County face numerous challenges while learning the L2 because the sociolinguistic background of the teacher is usually different from that of the learners in the . Classrooms in Turkana West have multinational learners with different linguistic backgrounds acquired in their home countries. Emoticons present opportunities that can quickly fix these problems and can be harnessed to teach English language to proficiency levels in such learning environments. Emoticons are easy to learn and manipulate as compared to natural language that have regular grammar. The use of emoticons and emojis may help leverage STEM innovations through the language classroom process.

Keywords: Emoticons, English, Grammar, Innovations, Proficiency, Science, Technology

49. Hematological parameters dynamics in newly diagnosed pulmonary tuberculosis patients initiated on standard anti-TB treatment regimen

Edwin Mwilitsa, Sammy Kimoloi, Evans Raballah
mwilitsaedwin@gmail.com

Abstract

Background: Pulmonary tuberculosis (PTB) mortality remains high despite availability of effective anti-TB therapy. Disease and treatment-associated hematological derangements at diagnosis and during therapy might contribute to this high TB mortality rates.
Objective: The objective of this study was to determine hematological changes that occur during the course of the standard anti-TB treatment regimen.
Methods: The study adopted a longitudinal design in which 55 newly diagnosed HIV negative PTB patients were followed up to the fifth month of anti-TB therapy. Blood samples (5ml) were collected at diagnosis, second and fifth months and analyzed using HumaCount 5D hematology analyzer. Data was analyzed using Kruskal-wallis test with Dunnâ€™s multiple comparisons test in Graph-Pad prism version 6.0.
Results: At diagnosis, 14.5% of patients exhibited leukocytosis, 50.8% had anemia and 50.9% presented with thrombocytosis. Over the course of therapy there was a statistically significant time-dependent decrease in median total white blood cell counts from 6.82x103/uL at diagnosis 5.87x103/uL at the fifth month (P=0.0358). This decrease in total WBC count was majorly driven by significant decrease in the neutrophil numbers from 4.31x103/uL at diagnosis to 2.97x103/uL at the fifth month. The proportion of patients with anemia increased from 34.6% (n=18) at second to reach 40.4% (n=21) at the fifth month. There was also a significant decrease in MCV, MCH and MCHC at the second month compared to diagnosis. Moreover, the median platelet count, MPV, PDW and PCT% decreased from 314x103/uL, 8.9fL, 10.4fL and 0.273 at diagnosis to 232x103/uL, 10.15fL, 12.5fL and 0.235 at the fifth month, respectively.
Conclusion: In conclusion, a significant number of PTB patients presented with anemia, thrombocytosis and leukocytosis. The proportion of patients with anemia increased over time. The study recommends screening patients hematologically for tailored patient interventions.

Keywords: Anemia, Leukocytosis, Thrombocytosis

50. Life Skills Training And Behaviour Modification Among Youths In The Institutions Of Higher Learning

Christabel Ong'ayo, Issah Kweyu, Peter Bukhala

ongayochristabel7@gmail.com

Abstract

The present paper examined the importance of life skills training among youth in institutions of higher learning. Youth generally face a myriad of challenges including drugs and substance abuse, early pregnancies, single parenthood, managing relationships, stress and time management, materialism, education inequality and shifting economy (World Youth Report 2019). Youth in institutions of higher learning face additional college related challenges as they pursue their careers and subsequent unemployment after graduation (Aytac and Bayram, 2001). Purpose of the study was to determine role of life skills training in enhancing 21st century skills among learners in the institutions of higher learning. The study was a survey that involved 320 students who volunteered to participate in the study. The students were drawn from various courses in school of Natural Sciences at Masinde Muliro University of Science and Technology. The study established that 99.3% of the respondents agreed that life skills training has changed their perceptions and attitude towards work and life in general while 95.3% felt they had developed appropriate team member skills. The results further indicated that 88.2% of the respondents held the view that Life skills training should be compulsory subject in the university. The study conclusion underscored the importance of life skills training in promoting 21st century skills among youth in institutions of higher learning, which is a boost to the youth employability chances after college.

Keywords: Youths, Life Skills training, Higher learning institutions.

51. Effect Of Class Size On The Academic Performance Of Students In Mathematics In Public Day Schools In Musanze District, Rwanda

Emmanuel Byiringiro

byiremmy@gmail.com

Abstract

Teaching and learning in an overcrowded class room can be frustrating, overwhelming and stressful. An overcrowded classroom presents challenges that can feel impossible to overcome, even to the most effective teachers, the challenges restrain teacher's effectiveness and make teachers less productive in dishing out what they have for the student. The concern of this study is to assess the effect of class size effects and students' academic performance in Mathematics subject in public day Schools in Rwanda; A case of Musanze district. Specifically, the study attempted to determine the effect of class attendance on academic performance of mathematics subject in public day schools in Rwanda, to analyze the effect of classroom seating arrangement on academic performance of mathematics subject in public day schools in Rwanda and to establish the effect of classroom learning environment on academic performance of mathematics subject in public day schools in Rwanda. This study adopted a descriptive research design using a mixed methods research design; a combination of both quantitative and qualitative forms of research. The target population for this study was the educational practitioners in the district who includes Students, teachers, head teachers and Sector Education officer in the district. Thus the total population was 1600 participants. Sample random technique was used to sample 320 respondents taken as a sample size. Quantitative data was analyzed through descriptive statistics. Qualitative data was analyzed through content analysis. Analysis of data was aided by statistical packages for social science (SPSS) version 21 and output exported to micro soft word in form of pie charts and tables for the purpose of reporting. From the findings, the study revealed the Pearson correlation analysis showed that class attendance ($r=0.814$, $p=0.000$) is positively and significantly related to students' academic performance. The correlation was deemed to be statistically significant since the p-value was less than 5%. Similarly, the Pearson correlation for classroom seating arrangement ($r=0.715$, $p=0.000$) is also positively and significantly related to the supply chain performance. The correlation was also statistically significant since the p-value was less than 5%. Lastly, the Pearson correlation for classroom learning environment ($r=0.794$,

p=0.000) is positively and significantly related to the students' academic performance. The correlation was also statistically significant since the p-value was less than 5%. Finally, the study recommended that to ensure a more meaningful academic performance among the students, small class sizes are needed to improve the interaction between teachers and students. It is therefore pertinent that the management of the schools studied pay attention to the class sizes as pertained in their schools to ensure good academic performance.

Keywords: Class size , Academic performance , Mathematics , Musanze district

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52. Management Of Emergencies In Schools - Lessons From The 2004 Leptospirosis Outbreak In Bungoma County, Kenya

D Nanyende, Jacob Wakhungu

davnanyende@yahoo.com

Abstract

Disasters both natural and man-made are becoming more common in schools causing negative impacts on learning. The most common natural disasters include floods, droughts, landslides, lightning strikes, windstorms and disease outbreaks. The artificial disasters include fires, building collapse and physical violence. The most notable public health emergency in Kenya is the outbreak of Leptospirosis in Bungoma County in 2004 and is listed as one of the major public health disasters. A cross-sectional study was carried out between January and June 2017 with the objective of evaluating the impact of the Leptospirosis outbreak of 2004 on learning and the Public Health strategies implemented to manage the emergency. Hospital records at health facilities within the region were examined to show the disease trends. The study shows that the outbreak had serious impact on learning in affected schools including deaths, disruption of learning, low self self esteem among students which is reflected in poor performance. The findings of this study are important in informing the implementation of appropriate and timely preparedness strategies for managing emergencies in learning institutions before they escalate and result in severe consequences especially in the learning of STEM subjects.

Keywords: Disaster, emergencies, leptospirosis, learning institutions, STEM

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53. Interdisciplinary Approaches: The Role of Creative Arts, Languages, and Social Sciences in STEM

Livingstone Eshitika
leshitika@mmust.ac.ke

Abstract

In recent decades, STEM has gained prominence for its transformative influence on technology, healthcare, infrastructure, and many aspects of modern life. However, as society advances technologically, there is growing recognition of the need to integrate creative arts, languages, and social sciences with STEM fields to ensure a holistic progress in sustainable development. STEM disciplines focus on problem-solving through innovation, engineering, and scientific discoveries, but they often lack the humanistic touch that the arts and social sciences provide. Without these elements, STEM innovations run the risk of being robotic, potentially creating environments devoid of empathy, creativity, and emotional depth. This paper explores the interdisciplinary relationship between creative arts, languages, and social sciences with STEM (Science, Technology, Engineering, and Mathematics). While STEM innovations have revolutionized modern life, the integration of the creative arts, languages, and social sciences humanizes these advancements, ensuring they cater to the emotional, cultural, and psychological needs of individuals. The paper analyzes how these fields complement each other, drawing upon global, regional and local studies. This research utilizes secondary data collection methods to gather information from peer-reviewed articles, government reports, and educational institutions' publications across different regions. Through secondary data analysis, the paper argues that the fusion of these disciplines fosters innovation, creativity, and sustainable development, highlighting key findings and providing recommendations.

Keywords: Interdisciplinary, STEM, Creative Arts, Languages, Social Sciences

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54. Use of ICT in Implementation of Competency Based curriculum in Kenya

Okaya Khasakhala, Hellen Okonji Okonji
eokaya@mmust.ac.ke

Abstract

With the rapidly growing integration of technology and its dynamic nature in teaching and learning, there is diverse opinions on the use of technology in class. The key issue that remains unresolved is what and how the implementation of integration of technology should be implemented. The purpose of the study was to assess the integration of technology in the teaching and the learning process in Kakamega County. It was anchored on social cultural perspective on knowledge and learning theory. The population was 151

teachers within 96 schools. Sample population was 128 teachers sampled using Criejcie and Morgan formulae. Data was collected by use of questionnaires and interview schedules. Validity of the instruments was established through expert reviews. Reliability of the study was established through split-half and was set at 0.7 and above and the alpha level of 0.05. Data was analyzed by use of descriptive statistics and inferential statistics. The results indicated that teachers were willing to use technology in their teaching and learning but faced challenges in acquisition and use of technological devices. Based on these findings, the study recommends for more technological devices and power supply to be availed to schools and teachers trained in the use of technology in class in order to fully implement the Competency Based Curriculum.

Keywords: technology, acquisition, use and availability

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55. Peer factors on Effectiveness of Preventive Intervention for Substance Abuse among Secondary School Students of Kakamega County

Felistus Nyamwoma, Moses Poipoi
nyamfely@yahoo.com

Abstract

The critical need everywhere in the 21 century world is to prepare students to lead healthy and fulfilling lives by providing them with relevant peer-related programmes in curbing behaviour problems such as substance abuse. Schools have put in place intervention programmes but little change has occurred. This paper analyses the extent of influence of peer factors on the effectiveness of substance abuse preventive interventions among secondary students in Kakamega County. It adopted a cross-sectional survey design. The target population was 59675 form three students, 1080 class teachers, 530 G/C teachers and 12 sub-county directors in the study area. Cluster sampling, Simple random and purposive sampling techniques were used to select the sample size; 381 students, 108 class teachers, 53 G/C and 12 sub-county directors of education. Structured questionnaires, focus group discussion guide and interview guide were used to collect data. The data was subjected to descriptive and inferential analysis using Statistical Package for Social Sciences. Qualitative data was transcribed, analysed and reported according to emerging themes. Based on correlation results, the study established that there is a positive association between peer factors and effectiveness of substance abuse preventive interventions in the study area. From the regression results, peer factors is a significant predictor. Therefore at 95% confidence limit peer factors have statistically significant influence on effectiveness of substance abuse preventive intervention. The study concluded that effectiveness of substance abuse prevention is dependent on peer factors. The preventive intervention in the study area range from self-management, peer to peer interaction and role play and

there is a statistically significant influence of peer factors on effectiveness of substance abuse preventive intervention as evidenced by a positive association (r=.240 N=270 p<.01) and [[F (1, 268) = 16.322, P<.05]; [[F (1, 57) = 26.732, P<.05], indicating that peer factors is a significant predictor. It was recommended that teachers should be very objective with those invited and address the perception of students over the entire exercise before engaging guest speakers.

Keywords: preventive abuse, substance abuse, secondary schools students

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56. Diversity, Equity And Inclusion In Stem Courses Among Girls In Public Universities In Kenya

Nyamwange Josephine, Khasakhala Edward
eokaya@mmust.ac.ke

Abstract

The idea of diversity, equity, and inclusion of girls in STEM subjects entails giving girls equal chances to participate and achieve, addressing the particular obstacles that girls encounter when pursuing STEM degrees, and actively including girls in STEM-related projects, activities, and conversations. However, gender differences in STEM sectors continue to be a major concern in Kenyan institutions. Girls are still under-represented in these fields despite several initiatives to advance gender equality. The study's purpose was to assess how diverse, equitable, and inclusive STEM courses were for female students in Kenyan universities. The study's objectives was to evaluate the current level of diversity, equity, and inclusion in STEM among female students in Kenya. This study used a mixed-methods research design that combined quantitative and qualitative techniques. Population of the study were female scholars, administrative personnel, and STEM students in Kenyan public universities. Random sampling was used to choose participants after stratified random selection was used to guarantee participation from diverse universities and groups (professor, administrative personnel, and students). 512 students from Kenyan public universities made up the sample size, which was established using Yamane's formulas. Experts from MMUST's Science and Mathematics Education (SME) Department validated the instruments, and changes were made in response to their feedback. The split half test, which yielded a reliability value of 0.81 at an alpha level of 0.05 and was judged suitable for use, was employed to guarantee the validity and reliability of the instruments. Questionnaires, interviews, focus groups, and document analysis were used to gather data. Thematic analysis, document analysis, narrative analysis, and inferential statistics were used to examine the data. According to the survey, women and girls are frequently deterred from pursuing STEM education and careers by

institutional, societal, and cultural barriers. Stereotypes, a dearth of role models, and restricted access to resources and assistance are some of these obstacles. The report suggests, in light of the results, that initiatives be put in place to promote and encourage girls to pursue STEM jobs, supporting academic regulations that encourage DEI in STEM education, strengthening of DEI initiatives, faculty should receive training on inclusive teaching methods and resources for female students.

Keywords: Kenyan universities, gender disparities, STEM, gender equality, underrepresented diversity, equity, inclusion

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57. Early Intensive Behavioural Intervention as A Predictor Of Development Of Social Communication Skills In Pre-Schoolers With Autism In Kakamega County, Kenya

Sussanah Leppannen Otieno, Nancy Nabalayo, Okaya Khasakhala

sussanahholeppannen@gmail.com

Abstract

Autistic Spectrum Disorders (ASD) is a neuro-developmental disorder defined and diagnosed by behavioural symptoms that indicate deficits in social and communication skills as well as a limited range of interests and activities. With the prevalence of ASD on the rise, there is a greater need for evidence-based behavioural therapies to mitigate the effects of symptoms on the functioning of pre-schooners with ASD, their educational attainment, and their eventual inclusion in their communities. The study investigated the effects of Early Intensive Behavioural interventions (EIBI) on development of social communication skills in preschool aged children with ASD in Kakamega County, Kenya. Target population was 34 parents of pre-scholars with ASD, 34 teachers in charge of schools for learners with ASD, 12 sub county TSC directors of education, 4 EARC officers and 4 social workers drawn from four counties. Data was collected using questionnaire, interview schedule, and observation schedules. Results of the study indicate that EIBI is an established treatment for ASD which can lead to appropriate social skills development and improvement in behaviour, communication, social, play and daily living skills and reduces challenging behaviour among pre schooners with ASD. Based on these findings, it is recommended that teachers be trained in the use of EIBI in order to foster holistic development of learners with ASD in their early years of learning

Keywords: ASD, EIBI, challenging behaviours, communication holistic development

58. Robot Manipulator Programming Via Demonstrative-Kinesthetic Teaching for Efficient Industrial Material Handling Applications

Griffin Pilot, Peter Cherop, Emmanuel Osore
seig01-701902022@student.mmust.ac.ke

Abstract

The Fourth Industrial Revolution (4IR) is on course for onboarding by the various manufacturing industries. The fluctuating nature of consumer needs has made it necessary to renovate existing industry approaches to industrial activities. This is an attempt to hold a competitive edge over conventional manufacturing activities. The development of cyber-physical systems (CPS), technological advancements, and the integration of computers in manufacturing processes have seen the introduction of robotized systems to aid in the processes. This has led to the start of smart factories, hence smart manufacturing. Today, robots are deployed in social places for entertainment, hospitals for telemedicine, industries for various activities, and fields of exploration. The robot programming techniques have significantly advanced from traditional text-based language programming (TLP) and offline programming (OLP) to various paradigms of programming by demonstration (PbD), such as tele-kinesthetic teaching (TKT) and demonstrative-kinesthetic teaching (DKT). This paper aimed to program a robotic manipulator using DKT and contrasted it against programming using structured text for industrial material handling applications. The study was validated via palletizing and contour path welding experiments. The materials for the experiments were a robotic manipulator (Dobot Magician), a laptop, USB cables, and stopwatches. A control platform for the arm was created using Microsoft Visual Studio code. The platform allowed arm manipulation, demonstratively using the hand-held trigger button on the forearm to capture motions. The palletizing and contour path weld experiments used the DKT and structured texts as programming modes. The results showed a shorter DKT reaction time than structured texts when conducting the palletizing experiment. The palletizing experimental time was lesser than when performed over the structured texts. The contour path welding indicated an equal reaction time for both programming modes but comparable experimental times. The efficiency of the DKT was taken on account of comparison of the reaction and experimental time to the structured texts, which served as the control experiment. The conclusion was that DKT was more efficient as a manipulator programming method than structured texts. Future works aimed at actual contour path welding, and improvement on the control platform to a more user-friendly interface.

Keywords: Dobot Magician, Demonstrative-kinesthetic teaching, robot manipulator, material handling, palletizing.

59. Integrating Artificial Intelligence in STEM Pedagogy: Transforming Deaf Education in Kenya Using AI for Kenyan Sign Language in Science Subjects

Joel Okutoyi, Maurine Kangahi
joelokutoyi@gmail.com

Abstract

The integration of Artificial Intelligence (AI) in education offers a transformative platform to revolutionize learning experiences, particularly for learners with special needs and marginalized groups, such as the deaf community. A notable development is the AI for Kenyan Sign Language (AI4KSL) application, created by researchers from Maseno University between 2022 and 2024. This app aims to improve educational outcomes and promote inclusive education for deaf learners in Kenya, addressing the significant shortage of educational resources and skilled Kenyan Sign Language (KSL) interpreters. While AI4KSL presents unique opportunities for Deaf children to engage in learning independently-without the need for an interpreter-, there is limited exploration of its long-term impact on their educational experiences and outcomes. Furthermore, existing literature often overlooks the challenges faced by educators in integrating AI into STEM (Science, Technology, Engineering, and Mathematics) pedagogy specifically tailored for deaf learners. This paper seeks to investigate how AI can support KSL in science education, fostering an inclusive and effective learning environment. By analyzing current KSL data sets, identifying barriers to AI implementation in deaf education, and proposing strategies for effective integration, this research aims to establish a comprehensive framework that transforms STEM education for deaf students in Kenya through AI4KSL. The findings will contribute to a deeper understanding of AI's role in promoting educational equity while addressing the specific needs of marginalized learners.

Keywords: Integrating, Artificial Intelligence, STEM Pedagogy, Transforming, Deaf Education, Kenya Using AI for Kenyan Sign Language, Science Subjects

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60. Modelling the impact of devolution on youth unemployment rates in Kenya using ARIMA-Intervention model

Samuel Usolo, Annette Okoth, David Angwenyi
sammyusolo99@gmail.com

Abstract

Orientation: Youth unemployment is a significant problem, particularly for African economies which have the world's youngest population of almost 200 million, with a median age of 19.7 years. Moreover, this number is expected to double by 2045, making the already bad situation more grave. Globally, youth unemployment rate stood at 15.58% by

2022, with Africa accounting for over 20%. Studies show that while the overall unemployment rate in Kenya is at 12.7%, youth (15-34 years), who form 35% of the Kenyan population account for 67%. This remains a big challenge, despite numerous efforts by past successive governments to mitigate the already alarming situation by introducing interventions such as Kazi kwa vijana (jobs for youth), and promotion of youth employment through Youth Enterprise Development Fund (YEDF), Kenya Youth Empowerment Project (KYEP) and Youth Employment Scheme Abroad (YESA).
Research purpose: To model the impact of devolution on youth unemployment rates in Kenya using ARIMA-Intervention model.
Research approach: Both descriptive and inferential statistics were employed in this study. Secondary data from the World Bank data bank was used. This was implemented using the R software.
Main findings: ARIMA (1, 0, 0) with the least AIC value of -47.43 was found to be the most adequate model for modelling time series data on youth unemployment rates before devolution. ARIMA(1,0,0) with the intervention order (r,s,b) (1,0,1) was found to be significant in modelling the impact of devolution on youth unemployment rates in Kenya, since all the estimated parameters were found to be significant at 5% significance level. Before devolution youth unemployment rates had an average value of 6.96%, during devolution, youth unemployment rates had an average value of approximately 10.21%, By contrast, in the absence of devolution, we would have expected an average response of 7.16 %. The probability of obtaining this impact by chance is very small, $p = 0.001$. Posterior probability of a causal effect is 99.89879%. This means that the causal effect can be considered statistically significant.
Practical implications: From these statistics, it is evident that devolution has led to an increase in youth unemployment rates. This increase implies that devolution as an intervention has had a negative impact on youth unemployment rates.
Contribution: A number of studies conducted on youth unemployment rates in the Kenyan context have not addressed the significance of devolution on the same. This study therefore sought to bridge this gap by modelling the impact of devolution on youth unemployment rates in Kenya, using Autoregressive Integrated Moving Average-Intervention model.

Keywords: ARIMA - Intervention modelling; Youth Unemployment; Devolution; Comparative Analysis

61. **Teachers Achievement in Comprehensive Learning Environment Performance Contract Target Effect on Pupils Learning Outcomes in Public Primary Schools in Kakamega County, Kenya**

Caroleen Murunga Saya, Judith Achoka, Jason Nganyi
caroleensaya@gmail.com, achokajudith@yahoo.com, jnganyi@mmust.ac.ke

Abstract

In the year 2012, the Teachers Service Commission (TSC) in Kenya launched the Performance Contract (PC) policy in the teaching service. This was in response to reports of failure of the Ministry of Education in meeting some of the targets outlined in the Kenya Education Sector Support Project (KESSP) of 2005-2010. The goal of PC was to enhance the quality of education offered to learners through strengthening supervision and continuously monitoring teacher performance at the institutional level. Performance of teachers in the PC is monitored through regular teacher appraisals on their effectiveness, guided by predetermined set targets from the Teacher Professional and Development (TPAD) tool. Despite PC having been in place over last eleven years, its effect on pupil learning outcomes in Kakamega County Public primary schools is still not clear. The purpose of this study was to establish the effect of teachers' achievement in comprehensive learning environment PC target on pupils' learning outcomes in public primary schools in Kakamega County in Kenya. The target of comprehensive learning environment aims to create Child Friendly Environments (Schools) or learner friendly environments. A Correlation research design with a mixed methods approach was adopted for the study. Eighty-two (82) schools were selected from 13 Sub Counties of Kakamega County using a multistage random selection sampling. Structured questionnaires were used to collect data on target achievement and learning outcomes From Head teachers and teachers in the selected schools for the period 2018 to 2023. Four key informants involved in PC appraisals (2 Curriculum Support Officers 2 Sub County TSC Directors and the County TSC Director) were purposefully selected and interviewed. The quantitative data collected was analyzed using descriptive statistics and Pearsons' correlation. The qualitative data was analyzed thematically. The results of comprehensive learning target achievement by teachers and pupil learning outcomes association were KCPE performance (r=.0.295; P= 0. 0.540); retention rates (r= 0. 630; p=0.180) and completion rates (r=0.326; p=0. 528). These associations are weak and statistically insignificant across all measures examined in the study. The key informants also revealed that the process of PC appraisal was not being taken seriously and had been seen as a routine procedure by teachers. The study recommends that TSC reviews the criteria used for PC target on comprehensive learning target to ensure they are aligned with actual teaching practices and learning outcomes. There is need for further research to explore other factors influencing learning outcomes beyond teacher target achievement, such as socioeconomic status, parental involvement, school resources, and curriculum effectiveness.

Keywords: Target achievement, comprehensive learning, Performance contracts, Learning Outcomes

62. EFFECTS OF STEM EDUCATION PROGRAMME ON CHEMISTRY PERFORMANCE AMONG STUDENTS IN EXTRA COUNTY SECONDARY SCHOOLS IN NORTH-RIFT REGION, KENYA

Dr. Peter Kibiwot Ngeny & Dr. Rose Atoni

peterngeny@gmail.com
rose.atoni@yahoo.com

The Catholic University of Eastern Africa

ABSTRACT

The study examined the effects of Science, Technology, Engineering, Mathematics (STEM) education programme on Chemistry performance among secondary school students in North-Rift Region, Kenya. The study was anchored on Social Learning Theory. Causal comparative *ex post facto* research design guided the study. The target population was 3550 form four students and 175 teachers of Chemistry. Simple random sampling was used to select six Counties in North-Rift Region. Stratified random sampling was used to separate schools to STEM and Non-STEM schools and simple random sampling technique was then used to sample out students and teachers. The sample size consisted of 1092 respondents. Data were collected using questionnaire, a document analysis schedule and a Chemistry achievement test. Reliability of the evaluation instruments was examined using test-re-test method. Data were analyzed using descriptive statistics and hypotheses were tested using t-test for independent groups. The study findings revealed that chemistry performance among students was good and was associated to STEM education programme. Study findings established that students' performance in Chemistry in STEM schools (Mean 21.68, SD 6.17) was higher than in Non-STEM schools (Mean 19.06, SD 7.15). The difference in mean scores in STEM and in Non-STEM schools was established to be statistically significant implying that students' performance in Chemistry was dependent on the school where a student studied whether STEM or Non-STEM. The Chemistry performance in both categories of schools was greatly associated to STEM Education programme under implementation, which was more effective in STEM schools than in Non-STEM schools. The number of Chemistry projects presented by students was higher in STEM (173) than in

Non-STEM schools (144). The study also established that students lacked adequate space to design projects and hence it was recommended that an innovation room (makerspace) be constructed in each school to enhance creativity and innovation and allow students to expand on the number of Chemistry projects.

Key words: Science, Technology, Engineering, Mathematics, Performance.

63. FACTORS INFLUENCING THE USE OF MOBILE PHONE ENABLED SERVICES FOR ACCESSING AGRICULTURAL INFORMATION BY SMALLHOLDER FARMERS IN BUNGOMA COUNTY, KENYA.

OKUMU, L.M., WAKHUNGU J. W., NDIEMA A.C., OKOTH A.W.

Masinde Muliro University of Science and Technology,Kenya

Corresponding Author; marylusike@gmail.com,

Access to mobile phone-enabled services has emerged as a vital tool for smallholder farmers, offering significant benefits in improving agricultural productivity and access to essential information. In Kenya, where agriculture is the backbone of the economy, mobile phones provide farmers with opportunities to obtain real-time information on agricultural practices. Despite the trans-formative potential of these mobile services in enhancing agricultural activities, several factors impact their effective utilization among smallholder farmers. This study aimed to evaluate the role of mobile phone-enabled services in providing agricultural information to smallholder farmers in Bungoma County, Kenya. The primary objective was to assess the contribution of such services to the socioeconomic well-being of these farmers. The research employed a cross-sectional and correlational design, targeting smallholder farmers, with a specific focus on vegetable farmers as the accessible population. A sample of 400 respondents was selected using stratified and simple random sampling techniques. Data collection was carried out through questionnaires, and a pilot study was conducted in Kimilili Sub-County, Bungoma County. To ensure the instruments' validity, both face and content validity were used, while reliability was tested using Cronbach's alpha coefficient. Quantitative data were analyzed descriptively and inferentially, with results presented in tables and charts. The findings revealed that the cost of using mobile phones was the most significant factor influencing farmers' choice of mobile network, as reported by 52.4% of the respondents. Additionally, 75.8% of smallholder farmers who owned mobile phones did not use them to access agricultural information, citing the complexity of mobile phone technology and high costs as major barriers. The study confirmed that the factors influencing the use of mobile phone-enabled services, such as cost, ease of use, network availability, and technical knowledge, have a statistically significant effect on farmers' ability to access agricultural

information. These factors present both challenges and opportunities for enhancing service uptake. From the findings of the study, it was recommended that the government, mobile network providers, and other stakeholders should explore ways to reduce the cost of mobile phone usage for agricultural purposes. Subsidies, targeted data packages for farmers, and partnerships with agricultural information providers could make mobile services more affordable and accessible. Furthermore, to address the complexity of mobile phone technology, there is a need for extensive capacity-building programs aimed at improving the digital literacy of smallholder farmers. Training should focus on simplifying the use of mobile-enabled agricultural platforms and providing user-friendly interfaces tailored to farmers' needs.

64. "Transforming STEM Pedagogy: Feedback-Driven Professional Growth for Teachers"

Makoba Kizito, *& Thuo Karanja*
Email:mkizito@cemastea.ac.ke;tthuo@cemastea.ac.ke
Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA), Nairobi, *Kenya*

Sub-Theme: *Integrating Sustainability into STEM Curricula*

Abstract

Enhancing teaching practices through effective school-based monitoring and support is crucial for the continuous professional development of teachers. This paper examines the significance of structured observation and feedback mechanisms in improving classroom practices, particularly in STEM education. Using the example of a lesson on Archimedes' principle, we highlight how targeted interventions can facilitate active learning and deeper student engagement. The lesson transcript illustrates key areas for improvement in pedagogical approaches, such as promoting inquiry-based learning and fostering student-led discovery. The teacher's role in guiding experiments and encouraging critical thinking through questioning is emphasized, showcasing how real-time feedback can enhance instructional quality. The study advocates for professional development programs integrated with regular classroom monitoring to ensure teachers receive personalized support and practical strategies for refining their teaching methods. By embedding professional development within the school environment, educators can continuously

adapt to dynamic classroom needs, thereby improving student outcomes and fostering a culture of reflective practice.
Keywords: *teacher professional development, school-based monitoring and support, effective classroom practices, STEM education, student engagement, reflective practices, continuous improvement*

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