



Contents

1. Research Findings
2. Monitoring and Evaluation of County INSET
3. Conference Presentations and Attendance
4. Research Resources
5. On-going Researches
6. Upcoming Events and Projects

Inside this issue

Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA) is a public institution under the Ministry of Education Science and Technology (MOEST). CEMASTEAs is mandated to build the capacity of mathematics and science teachers for effective teaching and learning. The CEMASTEAs Research and Development (R&D) bulletin provides information and updates on researches undertaken and other activities for a given year. In this issue, updates and information are given for 2016. For more information, contact the Coordinator, R&D at rdcoordinator2015@gmail.com

Research Findings

A study reveals low student enrolment in physics

A study conducted by Chemistry Department to understand the process of selection of science subjects at Kenya Certificate of Secondary Education (KCSE) and factors influencing the selection in one of the counties in Kenya showed a worrying low enrolment of students in physics as compared to chemistry and biology. The study involved principals of selected schools in the county, careers' masters and mistresses in the schools as well as science (i.e., biology, chemistry and physics) teachers and Form Three students. In total, 23 principals, 23 careers masters/mistress, 70 science teachers and 1081 Form Three students participated in the study. Data were collected from teachers and students through questionnaires and one-one interviews with principals and careers masters/mistress.

The following are findings from the study:

- It was found that 100% of the students who participated in this study take chemistry, 85% take biology and only 38% take physics. These findings are consistent with the statistics available from the Kenya National Examination Council (KNEC) on the candidature in these subjects. In most of the schools, students were not given opportunities to decide the science subjects to study. Rather, the subjects were taken based on what most principals and careers masters/mistresses referred to as "school policies" bluntly stated, "chemistry is compulsory in this school" or "chemistry and biology are compulsory". Such "policies" left students with no option but abide.
- In some of the schools, students were asked to take no more than two science subjects. This was ensured through timetabling where two of the science subjects (i.e., biology and physics) were taught at the same time thereby inhibiting students from taking both subjects. Indeed, five schools were found not to have presented any candidates in physics at KCSE for 2-3 years preceding this study even when they had presented

candidates in other subjects. Further examination of the data revealed that the students preferred to be left to decide the science subjects they would like to study and even some yearned for opportunities to study more than two science subjects where they were limited to taking only two science subjects.

- Several factors were found to be influencing some schools to navigate away from physics as follows:
 - **Careers-** most principals and careers masters stated that careers in science-related fields require chemistry.
 - **Resources-** in some schools, inadequate resources (i.e., number of laboratories, and equipment and materials) were given as reasons for fewer students in physics.
 - **Personnel-** (i.e., teachers) in terms of number and personal characteristics (i.e., some teachers discouraged students from taking physics).
 - **Performance in mathematics and physics-** in some schools, if students were perceived to be performing poorly in physics and mathematics, they would not be allowed to take physics.

These findings have implications for the Ministry of Education (MOE), Boards of Management (BOM) of schools and CEMASTEAs. For example, MOE needs to put in place a mechanism for sustained monitoring of schools for purposes of determining the level of implementation of MOE guidelines on selection of science subjects. CEMASTEAs needs to sensitise science teachers and principals on their role in guiding students in the selection of science subjects. The MOE and/or BOM as is appropriate need to provide adequate material resources to schools to enhance effective teaching and learning of all science subjects.

Monitoring and Evaluation of County INSET

Monitoring and Evaluation (M&E) of County INSET is undertaken by CEMASTEAs staff every April and August to establish the quality of INSET in terms of facilitation and

management. In 2016, secondary INSET was conducted in all the 47 counties where a total of 7301 out of the expected 11670 mathematics and science teachers were trained in 85 INSET centres. This number represented a percentage turn up of 62.6%. The findings of the M&E exercise showed that most of the INSET centres held INSET of good quality in terms of facilitation and management. These were attributable to good facilitation skills by majority of county trainers as well as good planning by members of the County Teacher Capacity Development Committees (CTCDC) of respective counties.

At primary school level INSET was held in six colleges (i.e., Shanzu, Machakos, Egoji, Meru, Tambach and Chester) and two high schools (i.e., Mandera High and Mbita High). The INSET involved a total of 2544 out of the expected 3357 primary school mathematics and science teachers. This number represented 75.8% turn out. The INSET targeted teachers mainly from Arid and Semi-arid Lands (ASAL) regions

Conference Presentations and Attendance

Three papers were presented at international conferences as follow:

1. Mrs. Beatrice Macharia of Mathematics Department presented a paper entitled **“Pedagogical Shift from Pre-ASEI Condition to ASEI Condition”** at the 13th International Congress on Mathematical Education in Hamburg, Germany on 24th – 31st July 2016.
2. Mr. Thuo Karanja of Biology Department presented a paper entitled **“The Ignored Voice in Teaching and Learning: Students’ Insights on how Teachers of Science Can Improve Practice”** at the 23rd Conference on Learning in Vancouver, Canada on 13th – 15th July 2016.
3. Dr. Tom Mboya of Physics Department presented a paper entitled **“School Climate Aspects as Predictor of Students’ Achievement: A Case Study of Public Secondary Schools in Nairobi County”** at the 34th Annual World Conference in Lexington, Kentucky, USA on 2nd - 5th November, 2016.

R&D Department was represented during a mid-term conference on Action research in Lilongwe, Malawi on

13th - 14th October 2016 by two members of the Department, Mr. John Odhiambo of Biology Department and Mr. Simon Mugo of Mathematics Department. They were joined by Mr. Joseph Mathenge,



From left, Mr. Odhiambo, Mr. Mugo and Mr. Mathenge

Coordinator Training

Research Resources

CEMASTEА through R&D has secured access to online journals. To access content in these journals simply click on the link shown and browse

- African Journal of Research in Mathematics, Science and Technology Education and African Journal of Science, Technology, Innovation and Development from <http://www.tandfonline.com/>
- All journals and periodicals from www.jstor.org

Note: These journals are accessible only from CEMASTEА

On-going Researches

1. Baseline study to determine the level of readiness of the 47 selected STEM model schools, one in each of the 47 counties of Kenya is ongoing.
2. A research is ongoing to understand Quantity and Quality of Teacher-student interaction in selected counties and schools.

Upcoming Events and Projects

1. Primary Symposium

CEMASTEА through R&D is planning for a symposium for primary school mathematics and science teachers to be held in May 2017. The symposium is aimed at providing a forum for the teachers to showcase good classroom practices including sharing innovative lessons and teaching and learning activities.

2. Book writing project

A book writing project has been conceived and is being coordinated by R&D Department. For a start, four books have been identified for writing as follows: *ASEI-PDSI and SMASE programmes, A guide to Lesson study; Learner Involvement in Teaching and Learning and STEM Education in Kenya*. The books which are intended to be reference material are aimed at advancing knowledge and practice in Teacher Education. It is anticipated that by June 2017, the manuscripts of the books will be ready and submitted to the publisher.

<p>Centre for Mathematics, Science and Technology Education in Africa (CEMASTEА), P. O. Box 24214 00502, Karen-Nairobi, Kenya</p> <p>Phone: +254-20-2044406; +254-20 2633591; +254-0706-722697/0780-797648</p> <p>E-mail: info@cemastea.ac.ke,</p> <p>Website: http://www.cemastea.ac.ke</p>
--