Preliminary Report to Executive CAS on Trinidad Teacher Training Workshop

January 17th – 18 th 2018

The idea of establishing a Caribbean Academy of Sciences (CAS) was informally proposed at the General Assembly Meeting of the International Council of Scientific Unions [ICSU] in Bern, Switzerland in September 1986. In the following year, 1987, the Caribbean Academy of Sciences was founded. There was a need to have a critical mass of scientists for the Academy to be an effective regional force for science. The Academy included not only natural sciences, but also the agricultural sciences which have an excellent track record for scientific research in the region, the engineering sciences which have and continue to play an important role in the development of an industrial base in the society and the medical sciences which have an excellent record of scholarship and the development of medical institutions in the region. At a later stage, the Social Sciences were included. CAS membership is not restricted to the University of the West Indies, since the Academy embraces scientists working outside the university environment.

The Caribbean Academy of Sciences believes that a high priority should be put on science education of children, at the earliest stages, as the most positive way of improving the understanding of science and its values by Society. At the Caribbean Conference on Education for Sustainable Development, October 2005, we concluded that science education will be a major activity of the Academy in collaboration with the Ministries of Education, Teacher Education Colleges and general environmental groups. Within this framework of action, CAS has also actively participated in the IANAS Science Education Programme and will continue to generate and work on activities that will be included in future. These Workshops have been carried out since 2008 in Guyana, Jamaica, St Vincent and the Grenadines, Dominica, Antigua, St. Kitts Nevis and Barbados for both Primary & Secondary teachers from forms 1 -3. This particular STEM Teacher Training Workshop was designed and delivered by the Caribbean Academy of Sciences (CAS) for the Shell STEM programme.

The Facilitators delivered course material on an array of topics geared towards promoting an integrated approach in the delivery of Math, Science and Technology Education curricula in lower secondary school students in Trinidad & Tobago. The sessions were highly interactive and captured the interest of the teachers throughout the period. While the content targeted the lower school teachers and curriculum, its basic elements can be applied to all levels of the school system.

The objectives of the workshop were as follows:

i. Identify the purpose, and principles, of integrated STEM (Science, Technology, Engineering, and Mathematics) education
ii. Understand the research that underpins an integrated approach to STEM education
iii Apply the Design Cycle in practical activities that illustrate an integrated approach to STEM education
iv Source, and suggest appropriate modifications to, resources for integrated STEM lessons, units and/or activities
v. Understand how indigenous problems and resources can form the basis of an integrated STEM lesson, unit and/or activity
vi. Identify, and describe ways of overcoming, challenges in implementing STEM lessons, units and/or activities
vii. Promote communication and collaboration with colleagues, as part of an integrated STEM education support system
viii. Enact, and report the efficacy of integrated STEM lessons, units and/or activities in their classroom(s)

The original target group for the workshops was thirty-five (35) teachers, however there was an overwhelming demand during the registration process - with approximately one hundred and twenty-five (125) teachers expressing an interest, even after the close of registration. As a result, fifty (50) participants were listed for the workshop from over thirty (30) secondary schools throughout Trinidad. Further elimination from the fifty nominees were due to natural attrition and scheduling conflicts for the workshop days. A total of forty-two (42) teachers participated over the two day period.

Facilitators

The following team as in the Table facilitated the two-day workshop:

Name	Role	Affiliation/Experience
Dr. Rowena Kalloo	Co-ordinator	Teacher Training - Science
Professor Emeritus Winston Mellowes	Facilitator/ CAS President	Renewable Energy
Ms. Petal Jetoo (Guyana)	Facilitator	Micro-Science Kits
Mr. Otis Caruth	Facilitator	Science
Ms. Simone Henry	Facilitator	Mathematics
Dr. Cathy Radix	Facilitator	Robotics – Technology Education
Mr. Daniel Ringis	Facilitator	Robotics – Technology Education

This team combined academic experience, industry expertise and the highest standards of scholarship.

Listing of Attendees

The final list of participants included thirty-nine (39) on Day 1, while on Day 2 forty-two (42). This amount was inclusive of one (1) School Supervisor III of the South Eastern Division Education District. There were also a few visitors to the event. The table below illustrates.

Table 1- List of Attendees – Day 1

Attendee/Visitor	Amount
Secondary School Teachers	38
Ministry of Education Representative[1]	3
Media Official	1
TOTAL	**42**

[1] Inclusive of one registered participant

Table 2-List of Attendees - Day 2

Attendee/Visitor	Amount
Secondary School Teachers	41
Ministry of Education Representative [2]	3
Shell Official	1
TOTAL	**45**

Workshop Program

The workshop began promptly at 9:00am on day one with an official welcome by:

- Ms Karen Lynch – Principal Consultant, Sacoda Serv Ltd
- Dr Rowena Kalloo – Chief Facilitator
- Professor Emeritus Winston Mellowes – President CAS

[2] Inclusive of one registered participant
There is one person from Day 1 who was absent on Day 2

The sessions continued as scheduled below:

Table 3- Day 1 Agenda

TIME	SESSION & FACILITATOR
8:45am - 9:00am	**REGISTRATION**
9:00am - 10:30am	Introduction to colleagues & purpose of Workshop ***Winston Mellowes*** Concept and principles of integrated STEM education ***Rowena Kalloo*** Investigating Electromagnets ***Otis Caruth***
10:30am - 10:45am	**BREAK**
10:45am - 12:15am	Solenoids: A Technology Example ***Cathy Radix*** Solving Problems using Solenoids ***Daniel Ringis*** Classroom Practice ***Otis Caruth***
12:15pm - 1:00pm	**LUNCH**
1:00pm - 2:45pm	Robotics: An Engineered Technology Example ***Cathy Radix*** Grabbing LionFish ***Daniel Ringis*** Evaluation ***Simone Henry*** Classroom Practice ***Otis Caruth***
2:45pm-3:15pm	Challenges of integrating STEM in the local classroom ***Rowena Kalloo***
3:15pm-3:30pm	**WRAP-UP & EVALUATION** ***Winston Mellowes***

Table 4- Day 2 Agenda

TIME	SESSION & FACILITATOR
8:45am - 9:00am	**REGISTRATION**
9:00am - 9:30am	Small Group Session ***Rowena Kalloo***
9:45am-10:30am	Micro-Science Kits – Water Quality/Purification ***Petal Jetoo***
10:30am-10:45am	**BREAK**
10:45am-11:30am	SODIS – Solar Water Disinfection ***Winston Mellowes*** ***Petal Jetoo***
11:30am-12:15pm	A Solar Cooker for a hotdog ***Winston Mellowes*** ***Rowena Kalloo*** ***Simone Henry***
12:15pm-1:00pm	**LUNCH**
1:00pm-1:30pm	The Best Solar Hot Dog Cooker? Analysing results ***Winston Mellowes*** ***Rowena Kalloo*** ***Simone Henry***
1:30pm-2:30pm	Teacher Displays ***Otis Caruth*** ***Petal Jetoo***
2:30pm-3:15pm	STEM in Trinidad and Tobago: The way forward STEM and Literacy **Rowena Kalloo** **Petal Jetoo**
3:15pm-3:30pm	**WRAP-UP & EVALUATION** ***Winston Mellowes***

Conclusions

"I totally enjoyed the two days" noted one teacher at the workshop. From the beginning to the end of the Two Day workshop, the teachers were involved in activities, engaging them, exploring, explaining, elaborating and evaluating (The 5E approach). The workshop provided teachers with practical, cost effective techniques for teaching Science, Mathematics and Technological Education. Engineering principles were also introduced with Science and Mathematics content for classroom teaching. The framework used, engaged the teachers with activities and discussions to further enhance the everyday topics taught by them in their respective subject areas. The teachers were challenged to translate the high energy displayed during the workshop to their students. Two (2) similar workshops are planned for June/July of 2018 to expose more teachers to the material as a significant number of teachers have already expressed an interest in the workshop.

Prof Emeritus Winston A Mellowes