STEM Teacher Training Workshop Report

June 27th & 28th 2019

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Research · Results · Resolution

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1.0 Introduction

The STEM Teacher Training Workshop was designed and delivered by the Caribbean Academy of Sciences (CAS) for the Shell STEM programme. The team of facilitators conducted similar workshops in other Caribbean territories and are committed to Science Education in the region. 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 (30) teachers, forty one (41) teachers completed registration process. As a result, forty (40) participants were listed for the workshop from twenty six (26) secondary schools throughout Trinidad. A total of thirty nine (39) teachers participated over the two day period.

2.0 Training Team

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, it was 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 the future. These Workshops in IBSE/STEM 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.

The following team facilitated the two-day workshop:

Table 1-Workshop Facilitators (CAS members)

Name	Role	Affiliation/Experience
Rowena Kalloo	Co-ordinator	Teacher Training - Science
Winston Mellowes	Facilitator	Renewable Energy
Petal Jetoo (Guyana)	Facilitator	Micro-Science Kits
Otis Caruth	Facilitator	Science
Simone Henry	Facilitator	Mathematics
Cathy Radix	Facilitator	Robotics – Technology Education

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

Figure 1: *The CAS Team with Ms. Tricia Gilkes, (L-R) Professor Winston Mellowes, Dr. Rowena Kalloo, Petal Jetoo, Otis Caruth and Simone Henry. (missing – Dr. Cathy Radix)*

3.0 Attendance

The final list of teacher participants included thirty-nine (39) on Day 1, while on Day 2 thirty seven (37). The tables below illustrate.

Table 2- List of Attendees – Day 1

Attendee/Visitor	**Amount**
Secondary School Teachers	39
Media Official	1
Ministry Official	1
TOTAL	**41**

Table 3-List of Attendees - Day 2

Attendee/Visitor	**Amount**
Secondary School Teachers	36
Specially invited STEM Facilitator	1
Ministry Official	1
TOTAL	**38**

4.0 Agenda

The workshop began at approximately 9:15am on day one with an official welcome by:

- Dr Rowena Kalloo – Chief Facilitator
- Professor Emeritus Winston Mellowes – President CAS

The sessions continued as scheduled below:

Table 4- Day 1 Agenda

TIME	SESSION & FACILITATOR
8:45am - 9:00am	**REGISTRATION**
	Introduction to colleagues & purpose of Workshop ***Winston Mellowes***
9:00am - 10:30am	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 Solving Problems using Solenoids ***Tricia Gilkes*** Classroom Practice ***Otis Caruth***
12:15pm - 1:00pm	**LUNCH**
1:00pm - 2:45pm	Robotics: An Engineered Technology Example Grabbing Lionfish ***Cathy Radix*** ***Tricia Gilkes*** Evaluation ***Otis Caruth*** Classroom Practice ***Otis Caruth***
2:45pm-3:15pm	Challenges of integrating STEM in the local classroom ***Petal Jetoo***
3:15pm-3:30pm	**WRAP-UP & EVALUATION** ***Winston Mellowes***

Table 5- 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***

5.0 Content

The two (2) days contained a full slate of activity-based sessions with theoretical underpinnings, each linked to the objectives of the workshop. The activities included material which can be used in the classroom.

There were eight (8) main sessions during the workshop.

1. Orientation, Icebreaker, What is STEM

The workshop began with a general welcome to the teachers, after which they were divided into groups where they introduced themselves, stated their reasons for attending the workshop and identifying their group names. Dr. Kalloo who led the opening session, spoke on the STEM process of 'plan and design', where the process follows the cycle of a problem – a plan – make a model – test and reflect which was used throughout the workshop in all the activities. This led to the discussion of failure as a pathway for learning and other principles that will better shape the students' learning capabilities.

The group names were

- ✓ 'Motion Minds'
- ✓ 'Bright Ideas'
- ✓ 'Catalyst'
- ✓ 'Hammers'
- ✓ 'Jetsons'
- ✓ 'We Matter'

Dr. Kalloo ended her session with a Tanagram brain teaser activity, where participants received pieces of paper in various sizes and shapes and were instructed to put them together to make one basic shape. At the end, the challenge was made increasingly difficult with an additional shape being added, with the same instruction. This encouraged participants' critical thinking process and underscored her point that, the integrated use and application of knowledge is important. The activity also demonstrated the point that it is not about getting the answer right away; but to persist in trying to solve the problem and recognising that failure does not translate into termination of the exercise but can be a starting point to explore alternative solutions.

The teachers were asked at the end of Day 1 what was the best thing they learnt during the workshop, some of the responses included:

1. "I learnt about how STEM could be integrated into the classroom and I feel as though I will place greater focus on making my lessons relevant;"
2. "STEM education is a movement to develop mathematical & scientific underpinnings;"
3. "That STEM can be an effective tool in the classroom;"
4. "Critical thinking skills. Teachers from different backgrounds can work well together;"
5. "To put myself in my students' shoes and understand their issues better;"
6. "We can make almost anything an engaging interactive STEM learning experience. You just have to figure out how. RESEARCH;"
7. "I learnt to integrate different areas to expand learning in the school;"
8. "Integrating Science, Technology, Engineering & Math into lessons. Integrating Curriculum;"
9. "I learnt different strategies and approaches to use in the classroom to grasp students'' attention and enhance their learning;"
10. "To cater to the students' need for instant gratification – they need to know now, and they want to learn the fastest way so that they can get out the class;"
11. "I learnt the importance of collaboration from an equal participatory point of views allows for better generation of ideas;"
12. "New ways to implement the teaching of STEM in the classroom. Such as use of Science to show students how math is relevant in the real world;"

13. " From today's workshop I learned about the importance and impact of incorporating STEM in teaching Science;"

Figure 2:
A: Dr. Kalloo during her opening remarks for the workshop
B: One of the teachers discusses the tanagram puzzle with Dr. Kalloo
C: Dr. Kalloo holds up a poster illustrating the correct location for one of the pieces of the tanagaram puzzle

2. ***S- SCIENCE: Teachers will carry out two activities and decide which activity reflects Science at work.***

The teachers engaged in a session on suing technology to 'Investigating Electromagnets'. The session began with an activity where each group received the necessary materials and recorded the change of mass of an object that was being pulled by an electromagnet. Instructions were given on the basic set-up of the materials to achieve the desired goal of getting the electromagnet to work. As the group developed their models and began testing them they had to work as a team to resolve any issues that developed to make the electromagnet work; incorporating the STEM Plan and Design approach. Part of Mr. Caruth's lesson was the inclusion of ICT's in the classroom, so each group was afforded different pieces of technology such as a 'mass tracker', a high-end scale and

even a phone application – "Gauss Meter" which uses the magnetic field sensor of a high powered cellular phone, tablet or similar type device to measure magnetic flux density. Whilst each team had different issues to contend with, they were all able to resolve them.

Figure 3:
A: Mr. Caruth assists a group of teachers with their laptop set-up. B. The group of teachers try their hand at getting the mobile application to work.

3. ***E – ENGINEERING and T - TECHNOLOGY: Robotics: An Engineering Technology Example - Teachers are given materials and asked to design a prototype of a robotic arm***

This session was led by facilitator Dr Cathy Radix, which focused on Robotics: An Engineering Technology Example. This session began with a discussion of the types of robots already in existence and known in the world today. Her discussion then focused on the 'Seven parts of a robot' – Its mechanism, its drive (how it moves), its power supply, its censors, its actuators (parts that causes things to happen in the environment), the controller (the brain) and the communication interface. At the end of the discussion, the problem of the Lion Fish was introduced and the teachers were given materials to create a robot that can grab or catch fish. The teachers discussed ideas for their model in their designated groups. Designs were completed and a number of different robotic arms were built at the commencement of the afternoon session (Day 1). Each group was given bristol board to create a poster for the presentation of their models, detailing the materials they used, documenting their process in deciding on their model including how it could have been improved and whether they were successful or not. The teachers presented and demonstrated on how their model worked – by using it to grab/pick up three varying weights of "Lion Fish", with some individuals presenting individual projects- separate from their group. Those that were unsuccessful were given the opportunity to examine why it didn't work and also stated what they could have done better.

Figure 4: *A: Dr. Radix during her introduction of the robotics session. B-D: The teachers test out their prototypes*

4. ***Discussion***

A discussion ensued on linking the activities to objectives on the local Math and Science curriculum and identifying the Scientific and Mathematical concepts at work. They also identified the areas in the syllabus where the activities from previous sessions could work. Teachers were presented with a book of activities from the Institute of Physics (IOP) website and each teacher chose 3-4 activities which integrated STEM and was suitable for local syllabi. Discussions continued on identifying the advantages and challenges of implementation.

5. ***Water Quality / Purification using Micro-Science Kits***

Ms. Petal Jetoo, of the Ministry of Education - Guyana facilitated this session. Many of the participants indicated that they were unaware of Micro-Science Kits, their contents or capabilities. Ms. Jetoo provided a summary of what inspired the initiative within her country, identified the inventor and described how useful they have been in some of the countries that utilise them. She went on to explain the advantages of the kits, as they can be considered cost effective compared to a well-stocked lab and less dangerous as there were less chemicals to store. Ms. Jetoo did an activity with the teachers to provide the opportunity for engagement and interaction with the Micro-Science Kits. The activity that ensued, mandated that the teachers paid attention to the

contents of the kit. A Micro-Science Kit listing of the contents was distributed. Each group had to identify three items in the kit without using the names mentioned by previous groups. At the end they played "The Price is Right" for the teachers to guess the cost of the kits. The Facilitator pointed out that students can't learn only the content of science as the methods – an important factor would be missed and therefore they should use the practical side of science to capture the students' interest.

Subsequent to illustrating the importance of covering more than the content of a subject, Ms. Jetoo did a water purification experiment with the participants. This provided them with the opportunity to imagine the possible outcomes of the activity based on the theory and there was anticipation regarding the outcome of the experiment. As results were compared to their theories; the participants were energised and excited which further demonstrated the impact and effectiveness of the STEM approach - particularly the '5 E' approach. The 5 E's stood for Engage, Explore, Explain, Elaborate and Evaluate. In closing off the session Ms. Jetoo shared the following "*once you learn to know then you learn to do which eventually leads to the ability to repair the community*."

Figure 5:
A: The teachers are engaged in the ice breaker sessions where they have to identify the items contained in the micro-science kits
B: Checking the measurement and getting it right
C: Ms. Jetoo makes some observations after the teachers leave their samples outdoors for their experiments

6. ***Integrating STEM: SODIS – Solar Energy Disinfection / solar water heater***

Teachers were invited to develop and create a solar cooker for a hot dog from a pringles can. Prior to this the principles of solar energy were discussed and illustrated, with applications in the Caribbean being reviewed. At the end of the activity, teachers discussed how Mathematics could be incorporated within this lesson.

Professor Winston Mellowes facilitated this session starting at the basic level notwithstanding the advanced knowledge level of the group. He indicated that it was background knowledge or priority knowledge which is important for ensuring proper understanding amongst the students. He also made mention of the need for education for sustainable development, using things that are relatable to the students from their homes or their communities to explore science. He recognised that students enter the classroom with pre-conceived notions of a lesson or a subject which must be gently changed by the teachers. Suggestions were offered to assist in making the lessons more memorable, specifically equations, for example writing the equation 200 times every time it is written incorrectly. The use of diagrams were also suggested as a way to aid the understanding by students. At the end of his session, Professor Mellowes did a recap in point form to reinforce the clarity of the content delivered. The activity for this session was then identified and the materials were distributed to the groups. Each team was required to build a solar distillation model as well as a solar cooker, both to be tested outdoors.

Ms. Simmone Henry conducted the Analysis of the results obtained at the end of the experiments. She advised the teachers to help the students see the relation to other concepts instead of allowing the students to get the impression that they are learning individual topics. The use of "math pictures" – graphs, to illustrate the point to the students to keep them interested during mathematics sessions. Although students are taught in little "bits" at a time, it is not because the content is separate, but to give them the understanding that each "bit' is part of a whole.

She also discussed how critical it was to relate the content to real life experiences/situations and further demonstrated how mathematics fits into the science outside of the basic adding and subtracting. Using charts to represent data to get the results across to them in a way that is easily understood. Ms. Henry also indicated that 'math pictures' would most likely gain more interest by the students in what is happening in math and science by making information easier to follow. In addition to using one activity that can encourage learning for many different topics/lessons.

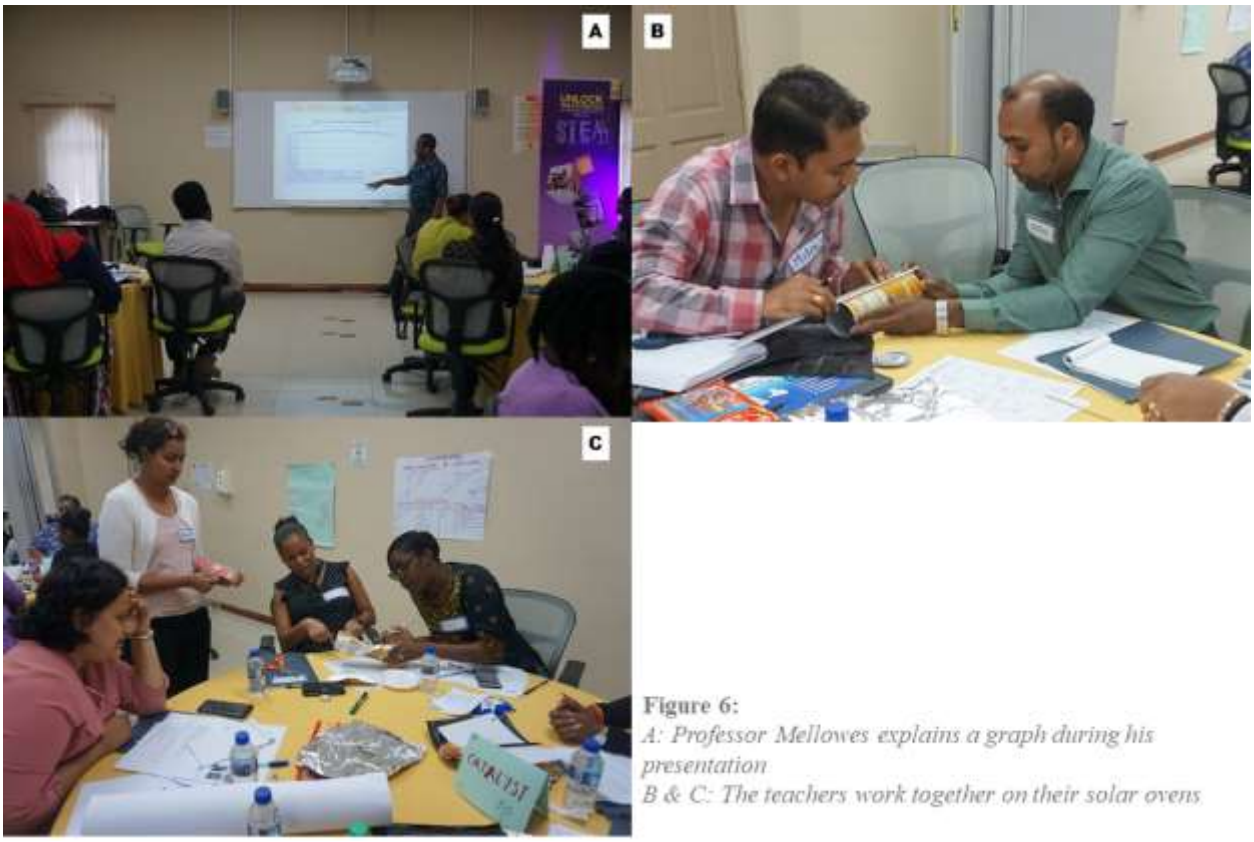

Figure 6:
A: Professor Mellowes explains a graph during his presentation
B & C: The teachers work together on their solar ovens

Figure 7: *A – E: The solar cookers built by the various groups of teachers*

7. ***Develop a toy, or a model of a piece of technology, that solves a problem of interest to your students, and illustrates at least one of the principles/or objectives in the Science, Mathematics or Technology Education syllabi.***

The item should be constructed using re-used/re-cycled/recyclable materials where possible, should be designed so that students would be able to independently construct it, and should not cost more than $20TT to produce.

The teachers were provided with the instructions before the workshop to develop the model. On day 2 of the workshop, teachers had the opportunity to present the items to the session. The facilitators commended the teachers for their efforts and noted their satisfaction with the items developed. Teachers presented an array of items that included the following:

Dr. Kalloo offered suggestions for using the various technologies to teach a class by testing prior knowledge before actually displaying and demonstrating. She further explained how various projects could be used to teach different areas including topics outside of its intended lesson.

Figure 8: *The teachers during their demonstration of their toys.*
A – Math doll
B – Cellphone speaker
C – Bag made from jeans
D – Hanger organizer
E – Mechanical to kinetic energy wheel
F – Timetable cup
G – Bottle Fan
H – Solar powered car

8. *Evaluation and the way forward*

The Teachers discussed the potential of the ideas presented for incorporation into their curriculum and the kinds of support needed for them to incorporate these ideas into their classrooms. Dr. Kalloo summarised the ideas of the two-day workshop, reiterating the strategies discussed inclusive of those shared by the participating teachers themselves.

Figure 9:
A – Ms. Henry during her discussion with the teachers.
B – Dr. Kalloo discusses the findings and goes through the analysis of the solar cookers
C – Professor Mellowes during his closing remarks

Figure 10: *The participating teachers pose for a group photo with the CAS team on the final day of the workshop*

6.0 Participants Feedback

Participants completed evaluation forms at the end of each day. The summary of the feedback is presented below.

The top two (2) favourable sessions mentioned were

1. Robotics Technology
2. Solar Cooker

The most favoured sessions for the workshop were the Robotic Technology with Ms. Cathy Radix, and the building the Solar Hotdog cooker as fifteen teachers each mentioned it as their number one session on day one and on day two respectively. The reasons for their choices included the ability to collaborate, their practicality, the imaginative aspects of them, its relevance and general interactive nature of the activities.

On Day 1, the following feedback was given by the participants.

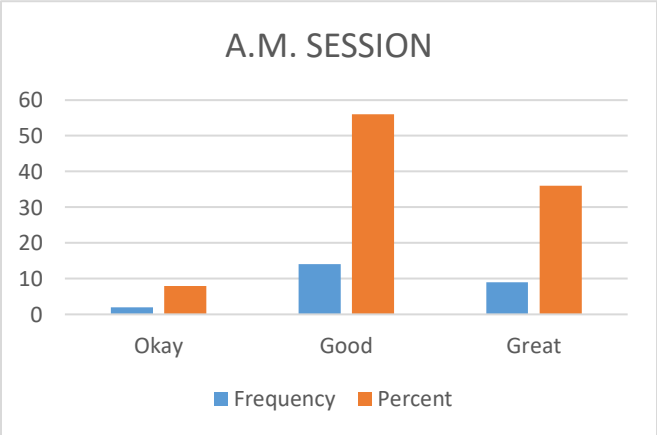

Figure 1- How would you rate the AM session?

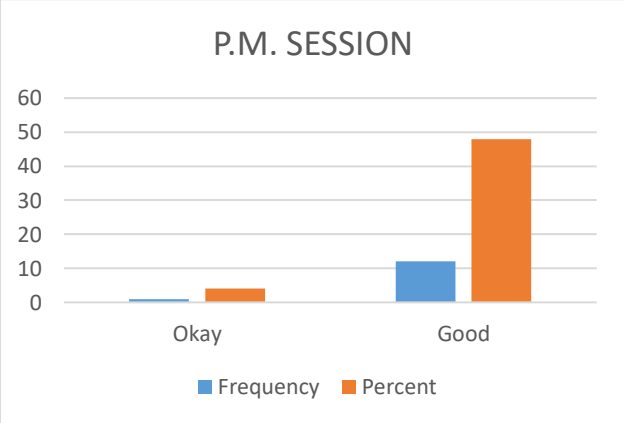

Figure 2-How would you rate the PM session?

The morning session was rated as "Great" by 36% of the participants and "Good" by 56%, totalling 92% of participants. This is an indication of an overall successful morning session as the majority of participants felt that the workshop was better than okay. The evening session received a rating of "Great" and "Good" by 48% of the participants in each area. A total of 96% of the participants rated the afternoon session as better than "Okay", reflecting a 4% increase from the morning session. This indicated that the workshop got better overtime during Day 1.

More important than the rating of the session is the likelihood of the teachers' implementation of what they were exposed to in the workshop. Below is a graph depicting how likely they would be to use the strategies in the classroom.

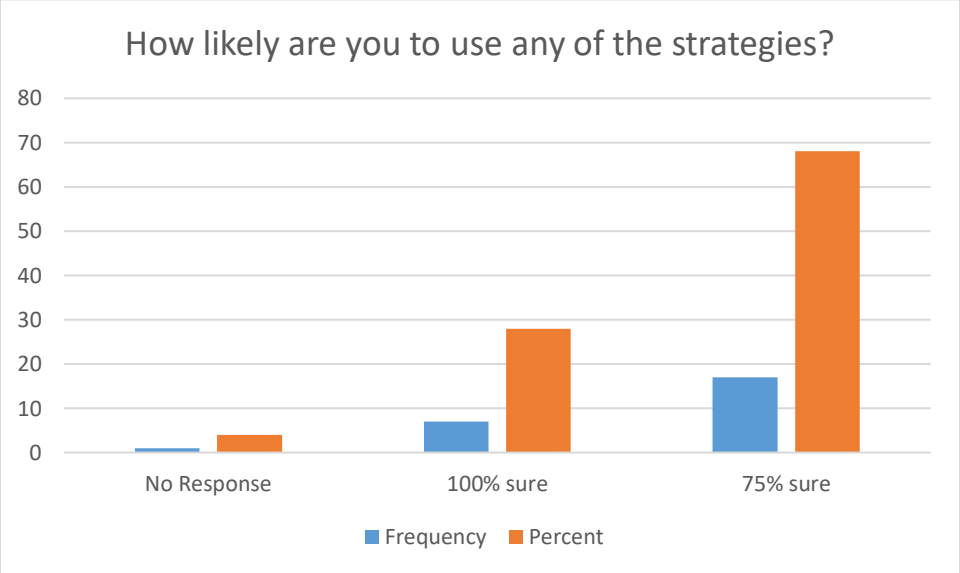

Figure 1- How likely are you to use any of the strategies?

While only seven participants said they were 100% sure to implement the strategies highlighted, seventeen (17) said they were 75% sure of implementation. This was 68% of the participants who were more than 50% sure to implement the strategies used – more than half who were present. Overall, this benchmarked the success of the workshop from Day 1, indicating heightened expectations for Day 2.

On Day 2, the following feedback was given by the participants.

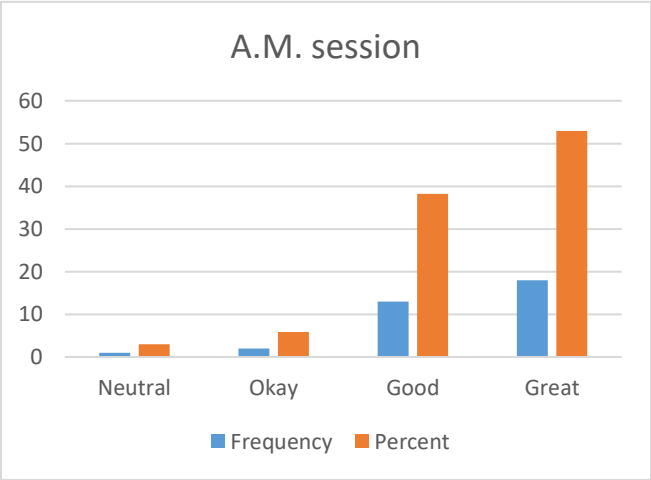

Figure 3- How would you rate the AM session?

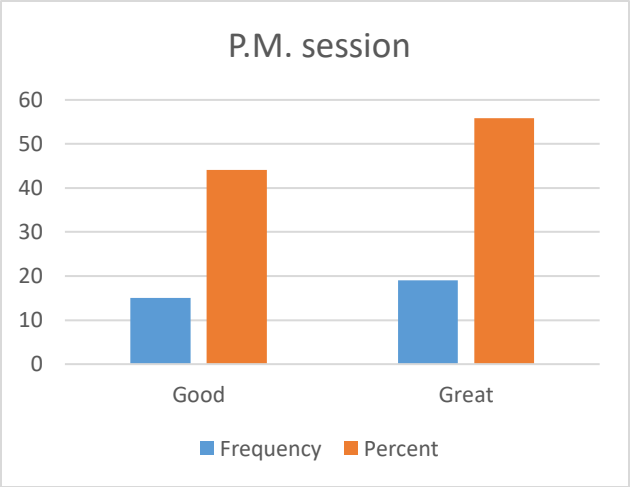

Figure 2- How would you rate the PM session?

The morning sessions on Day 2 received a rating of "Great" from 52.9% of the participants and a rating of "Good" from 38.2% with two ratings of "Okay" and one rating of "Neutral." This is an overall rating above "Okay" by 91.1% of the participating teachers. The percentage of teachers that rated the morning sessions above "Okay" increased by 0.9% in comparison with Day 1, indicating slightly better sessions on Day 2. The evening session on Day 2 received the best ratings of the two days, with 55.9 % of the participating teachers rating it as "Great" and 44.1% of teachers rating it as "Good" these ratings exceed both of Day 1's ratings as well with no ratings below "Good." The ratings gave an indication to the improvement of the entire workshop over the two day period.

Below is a graph depicting how likely the participants would be to use the strategies in the classroom from Day 2.

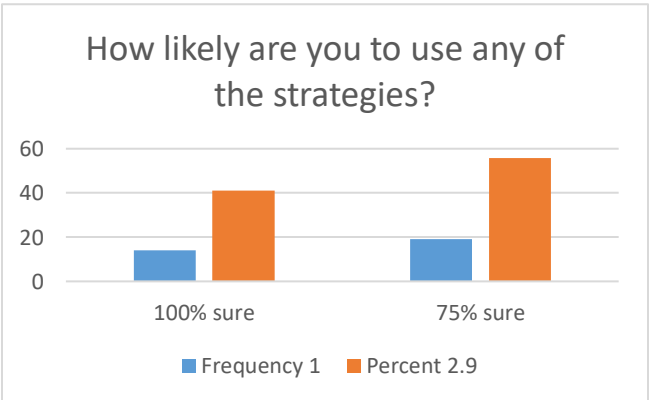

Figure 4- How likely are you to use any of the strategies?

On this day fourteen (14) teachers said that they were 100% sure to implement the strategies of the workshop an increase from Day 1. Nineteen (19) teachers indicated they were 75% sure to implement the strategies; and one of the participants did not respond to the question.

The strategies identified by the teachers to transfer to their classroom include:

- I will try to use science to introduce the concepts for my Math topics
- Use simple materials can be equally effective and learning the concept
- Utilising simple items e.g. for the tanagram puzzle to introduce a 'what is science' introductory lesson
- Group work to solve problems
- Integrating science with math

The stumbling blocks identified by the teachers in their implementation:

- Integrating science with math
- Wifi problems, not all students have phones, electromagnet experiment. Challenges to do all this with syllabus and not sufficient time with kids
- Acquiring resources and some students like to work alone
- The intellectual level of the students
- Admin and curriculum

7.0 Recommendations

- Hosting the workshop during a period of time that is not close to the marking of exam papers so that more Teachers are able to attend
- Hosting the workshop at least twice a year to reach a wider range of Teachers

8.0 Conclusion

Reviews received by the teachers were mostly positive over the two days, overall they commented about enjoying the group work and hands-on approach methodologies used during the workshop.

At the end of the workshop, when asked what they enjoyed most about the sessions, comments included "*Being able to solve problems in groups. Each person's input made the job easier to complete,*" and "*It was a fun and enjoying session which allowed us to work in groups"* When asked what they learnt from the sessions that may be useful for their classroom practices; "*How to integrate inquiry method into lessons*," said another; "*The importance of practical hands-on activities in classroom,*" and "*Hands-on learning can be a useful tool for authentic learning*." However they also cited the challenges such as; lack of resources and time constraints to plan with other teachers and implement the methodologies learnt with the curriculum.

During both days of the Two Day workshop, the teachers were involved in all 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 – despite the aforementioned challenges. 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 as well as technology where it is possible. Similar workshops are planned for 2020 to expose more teachers to the material as a significant number of teachers have already expressed an interest in the workshop.

9.0 Appendices

Appendix 1 – Attendance Register Day 1

Thursday 27th June 2019
STEM Teacher Training Workshop
UTT Chaguanas Campus

#	FIRST NAME	LAST NAME	SCHOOL	SIGNATURE
1	Allsa	Sankar	Princes Town East Secondary School	
2	Anisa	Ramlal	Waterloo Secondary School	
3	Avedesh	Balroop	Gasparillo Secondary School	
4	Bridget	Ramdhan	San Fernando West Secondary	
5	Cafian	Allen	ASJA Girls' College Barrackpore	
6	Camille	Kissoon-Fraser	St. Joseph's Convent, San Fernando	
7	Cheryl	Ramlogan	St. Joseph's Convent, San Fernando	
8	Dale	Dolly	Trinity College	
9	Daniella	Teelucksingh	Mayaro Secondary School	
10	Deborah	David	Rio Claro East Secondary School	
11	Diandra	Subeeksingh	Chaguanas South Secondary School	
12	Gabriella	Nero	St. Joseph Secondary School	
13	Gandhi	Kalloo	Matura Secondary School	
14	Imran	Mohammed	Penal Secondary School	
15	Jenalee	Samaroo	Trinity College Moka	
16	Jo-Ana	Lewis	Success Laventille Secondary School	
17	Kady	Beckles	La Romaine Secondary School	
18	Keisha	Ramjattan	Couva West Secondary School	
19	Keisha	Rampersad	Mayaro Secondary School	
20	Kimberley	Forde	St. Anthony's College	
21	Kizzy-Anne	Boatswain	St. Benedict's College	
22	Krystle	Gay	Trinity College Moka	
23	Mark	Ali	North Eastern College	
24	Marlon	Bobb	Success Laventille Secondary School	
25	Marsha	Mohess	ASJA Girls' College Barrackpore	
26	Mesha	Pran	Barataria South Secondary School	
27	Mitra	Ramroopsingh	Matura Secondary School	
28	Nadia	Ali	ASJA Girls' College Charlieville	
29	Natalie	Francois	Pleasantville Secondary School	
30	Neal	Saunders	Morvant Laventille Secondary School	

31	Petal	Bissessar	Chaguanas South Secondary School	
32	Radica	Seemungal	Waterloo Secondary School	
33	Ramona	Singh	Couva West Secondary School	
34	Reeshma	Jaggernath	ASJA Girls' College Charlieville	
35	Samuel Lyndon	Rampersad	San Fernando East Secondary School	
36	Shakira	Hamid	Barataria South Secondary School	
37	Someraj	Mahadec	Barrackpore West Secondary School	
38	Sparkle	Lewis	Morvant Laventille Secondary School	
39	Valiscia	Tobias-Young	Northgate College	
40	Zakiya	Edwards	Success Laventille Secondary School	
41	CHERYON	MORIN	St. Joseph's College	
42	KRISTOPHER-TIMMS		St. Joseph's College	
43	HAMEEZ	MOHAMMED	San Fernando East Sec	
44	ANNAYSHKA	ISHMAEL	ASJA GIRLS COLLEGE BARRE	
45				

Appendix 2 – Attendance Register Day 2

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Friday 28th June 2019
STEM Teacher Training Workshop
UTT Chaguanas Campus

#	FIRST NAME	LAST NAME	SCHOOL	SIGNATURE
1	Alisa	Sankar	Princes Town East Secondary School	
2	Anisa	Ramlal	Waterloo Secondary School	
3	Avedesh	Balroop	Gasparillo Secondary School	
4	Bridget	Ramdhan	San Fernando West Secondary	
5	Cafian	Allen	ASJA Girls' College Barrackpore	
6	Camille	Kissoon-Fraser	St. Joseph's Convent, San Fernando	
7	Cheryl	Ramlogan	St. Joseph's Convent, San Fernando	
8	Dale	Dolly	Trinity College	
9	Daniella	Teelucksingh	Mayaro Secondary School	
10	Deborah	David	Rio Claro East Secondary School	
11	Diandra	Subeeksingh	Chaguanas South Secondary School	
12	Gabriella	Nero	St. Joseph Secondary School	
13	Gandhi	Kalloo	Matura Secondary School	
14	Imran	Mohammed	Penal Secondary School	
15	Jenalee	Samaroo	Trinity College Moka	
16	Jo-Ana	Lewis	Success Laventille Secondary School	
17	Kady	Beckles	La Romaine Secondary School	
18	Keisha	Ramjattan	Couva West Secondary School	
19	Keisha	Rampersad	Mayaro Secondary School	
20	Kimberley	Forde	St. Anthony's College	
21	Kizzy-Anne	Boatswain	St. Benedict's College	
22	Krystle	Gay	Trinity College Moka	
23	Mark	Ali	North Eastern College	
24	Marlon	Bobb	Success Laventille Secondary School	
25	Marsha	Mohess	ASJA Girls' College Barrackpore	
26	Mesha	Pran	Barataria South Secondary School	
27	Mitra	Ramroopsingh	Matura Secondary School	
28	Nadia	Ali	ASJA Girls' College Charlieville	
29	Natalie	Francois	Pleasantville Secondary School	
30	Neal	Saunders	Morvant Laventille Secondary School	

31	Petal	Bissessar	Chaguanas South Secondary School	
32	Radica	Seemungal	Waterloo Secondary School	R. Seemungal
33	Ramona	Singh	Couva West Secondary School	R Singh
34	Reeshma	Jaggernath	ASJA Girls' College Charlieville	Jaggernath
35	Samuel Lyndon	Rampersad	San Fernando East Secondary School	
36	Shakira	Hamid	Barataria South Secondary School	S. Hamid
37	Someraj	Mahadeo	Barrackpore West Secondary School	
38	Sparkie	Lewis	Morvant Laventille Secondary School	
39	Valiscia	Tobias-Young	Northgate College	
40	Zakiya	Edwards	Success Laventille Secondary School	
41	KRISTOPHER	THOMAS	St. Joseph's College	
42	CHERYON	MORIN	St. Joseph's College	
43	SHAQUILLE	GEORGE	STEM/SACODA	
44				
45				

Appendix 3 – Evaluation

STEM Teacher Training Workshops

UTT Campus, Trinidad

Please rate the sessions for us. It will help us to improve our instruction.

Please circle the appropriate day: **Day 1 – June 27th 2019** **Day – June 28th 2019**

A. Please circle your subject area:

Science - Physics, Biology, Chemistry, Integrated Science, Env Science

Math Vocational/F&N/Clothing/Agri Science Other_____

B. Type of School

5-7 year denominational 5-7 year government secondary

5-7 year secondary (former comprehensive, or junior secondary)

C. Please indicate the forms you teach:

1 2 3 4 5 6

_____

1a. How would you rate the AM sessions? Please circle your choice -

Great ... Good... Okay ... Neutral.....Poor

1b. How would you rate the PM sessions? Please circle your choice -

Great ... Good... Okay ... Neutral.....Poor

2a. Which session(s) if any, did you enjoy most?

_____

2b. What did you enjoy most about the session(s)?

_____

1

3. What did you learn from the session(s) that may be useful for your classroom practice?

_____

4a. Which strategy/strategies are you most likely to use?

_____

4b. How likely are you to use any of the strategies in '4a.'? Please circle your response.

100% sure 75% sure 50 % sure 25% sure.....0% (no way Jose!)

5. What do you foresee as a stumbling block in the use of the strategies?

_____

_____

6. If there was something you would change about the sessions, what would it be?

_____

Are you willing to be interviewed for further information on the workshop? If so, please indicate by giving your name to the Chief Facilitator.

Thank you for your feedback