Leveraging the Caribbean Diaspora

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MIT Photonic Systems Group

The Caribbean: Challenges

- CXC exams scores in math not impressive
- STEM education not a national priority
- STEM education reform needed
- STEM teacher training very much needed
- Very few science & engineering jobs in Region
- Students avoid STEM-based careers
- Most Caribbean scientists & engineers live in Diaspora
- Science, technology, engineering not yet fully embraced as key tool for economic development

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Many in Diaspora would like to give back to Region to help with economic growth and diversification

CADSTI-CSF Model

Technical Expertise
Collaboration

Business Expertise
Funding

NGOs & Found.'s | Individuals | Diaspora Gov.'s | Regional Gov.'s

CARIBBEAN SCIENCE FOUNDATION

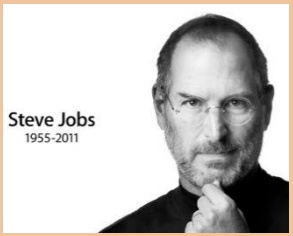
SEED Funding
Mentorship

Educational
Programs

Advisory
Role Only

Entrepreneurs | SPISE, SVC, STEM-Teacher-Train | Regional Gov.'s

Science and Engineering for Economic Growth and Diversification



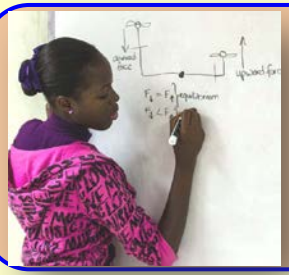
Science and engineering based entrepreneurship

New technology companies

Exports

Tourism

Economic Growth and Diversification



STEM-based education

Science and engineering based innovation

Caribbean Science Foundation (CSF)

CSF

The Implementation arm of CADSTI

(Non-profit, non-governmental, Diaspora driven)

http://caribbeanscience.org

MISSION

Same as CADSTI - Assist with diversification of Caribbean economies by harnessing S & T

GOALS

- **Assist with *STEM-based education reform***
- **Stimulate *technology-based entrepreneurship* by funding S&T projects in new and existing small enterprises on a competitive basis**

CSF Key Activities To-Date

A. Educational Projects (grooming the next-generation of Caribbean science and engineering leaders)

1. Student Program for Innovation in Science and Engineering (SPISE)
2. Summer internships for SPISE graduates at technology companies in the US and the Region
3. Sagicor Visionaries Challenge (STEM high school project competition)
4. Junior Robotics Camps (for 9-12 year olds in Barbados)

B. STEM Teacher Training Workshops (in collaboration with Caribbean Academy of Sciences)

C. Stimulation of Technology Entrepreneurship (Assembling SEED funds to ignite small business development

Student Program for Innovation in Science and Engineering (SPISE)

Four weeks of total immersion for our STEM superstars in university-level

- Calculus
- Physics
- Biochemistry
- Entrepreneurship
- Mandarin
- Computer Programming
- Humanities (Caribbean Unity)
- Under-water Robotics (MIT inspired)
- Electronics (renewable energy)

Rote learning discouraged. Critical, logical and analytical thinking encouraged. Focus not on grades. Focus on understanding and applying the fundamentals, and on mastery of the material.

Promoting a Culture of STEM: What Should Caribbean Countries do?

1. Popularize and raise awareness of STEM and its applications

- Promote "science is cool" factor for youngsters
- Educate parents and teachers on career options in S & T
- Identify/start nurturing exceptional talent in S & T early
- Create science museums
- Increase student participation in mathematics Olympiads, hackathons, coding camps and science fairs
- Celebrate student winners on TV and in other media

2. Provide more STEM teacher training (at all levels)

- Provide mentors, internships, summer programs for teachers
- Reward and celebrate the best STEM teachers
- Discourage rote learning. Encourage logical and analytical approaches to problem solving
- Teach the use of Inquiry-Based Science Education and Problem-Based Learning in classroom
- Encourage and promote the value of team work

Promoting a Culture of STEM (cont'd)

3. Syllabus Reform (needed at all levels)

- All students should take at least 1 science and 1 math subject each term until completion of high school (begin at age 8)
- Include more hands-on, inquiry-based and project-based subjects
- Teach research methods and practices (begin at age 8)
- Have students practice the use of fundamental theory to design, model, simulate, build, test, redesign, . . . Innovate (such ENGINEERING skills are missing in the Region)
- Teach scientific proposal writing skills (begin at age 8)
- Teach computer programming (begin at age 8)
- Teach business principles and entrepreneurship (begin at age 8)
- Teach Mandarin and lots of Spanish (mandatory - begin at age 8)
- Introduce courses in oral communication and negotiations (begin at age 8)

Promoting a Culture of STEM (cont'd)

4. Exploit the diverse and relatively untapped talent and resources resident in the Diaspora (for funding, technical expertise, business expertise, collaborations)

5. Promote STEM-based entrepreneurship

- **Goal should be to create a "Silicon Valley" type environment**
- **Find ways to attract world-class scientists and engineers, including foreign-born – e.g., use tourism as bait**
- **Identify competitive niche areas. Don't go head-to-head with U.S. or China**
- **Prioritize technologies with low financial barriers to market entry**
- **Identify sources of funding (local and foreign)**
- **Develop a local venture capital base**

Promoting a Culture of STEM (cont'd)

6. Reform Tertiary Education System

- University system has served Caribbean well. Must now reinvent itself
- University must break shackles of inherited colonial system
- Reform should be revolutionary not evolutionary
- Strong focus on science and ENGINEERING is needed
- Set up Scientific Advisory Board (SAB) comprising the wisest academic and business leaders from the Region and Diaspora
- More focus on innovation & entrepreneurship
- Teach proposal writing to lecturers and professors along with the design-model & simulate-build-test approach to innovation
- Identify and develop a few thrust areas within Centers of Excellence based on needs of Region, available research talent (in university and Diaspora) and commercial potential
- Work with incubators to facilitate tech transfer

Promoting a Culture of STEM (cont'd)

7. Governmental Reform

- Cultural shift is necessary
- Visionary leadership needed
- Make STEM Education a priority
- Invest more in STEM-related R&D (overall 1% of GDP recommended)
- Invest more in high-school laboratories
- Social problems must be tackled simultaneously
- Develop long-term (10-year) realistic strategic plan and policy
- Implementation is key

Closing Remarks

… the next "Google" can start in the Caribbean!

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