Grenada’s Ministry of Education

Lego Mindstorm Robotics as an ICT Tool in Education
Background

- September 2009 – Ministry of Education embarked on project Robotics an ICT tool for effective curriculum integration.

- Funded Sought ($50,000. US) - Ectel/World Bank

- Schools Identified – Five Secondary Schools

- Equipment Purchased

- Consultant contracted

- Schools given robotic kits

- Six months later exhibition and awards
Methodology

School selection

- 1 school with techno-savvy principal
- 1 school with strong community ownership
- 1 school from a deprived community
- 1 school with a weak principal
- 1 school with a principal of strong leadership skills
Methodology

Team selection

- 1 high achiever
- 1 average student
- 1 slow learner
- 1 divergent thinker
- 1 convergent thinker

Let us look at one of the teams below and their findings
ROBOTICS PLAN

PBC Robotics
Starting a robotics project using LEGO Mindstorms NXT Robotics Kits to Facilitate Experimental Learning in Science and Technology

Team of Robotics Teachers:
Mr. Sylvester /Information Technology
Mr. Peters /Mathematics
Mr. Britton /Physics
Mr. Thomas /Electronics

Chad Phillip-Programmer
Karlas Christopher-Body building
Jonathan Granger-Logistics /programming
Nikhail Drakes-building /logistics
Daniel Mahadeo-Scribe/logistics
Robot’s design objective:

“To Be Outside The Box”. To incorporate the different science fields: Physics, Mathematics, Electronics, and Information Technology. Also to stimulate problem solving, critical thinking, project management and communication skills in order to create a unique LEGO Robot.

- Physics- Balance
- Mathematics- Angles
- Electronics- Circuits and switches
- Information Technology- Programming
Team collaborating: planning & design
PBC’s Robotic Design Objective

- Walk with the use of eight legs.
- Detect and avoid objects.
- Detect and analyze objects based on color density.
- Detect and analyze high and low sound levels.
- Move towards highest or lowest sound level.
- Move or stop by touch.
- Implement light weight design for structural rigidity.
- Integrate balance and stability in the design.
PBC’s Robotic Design Objective

- Robot must be able to: Sense, Plan, Act

- **Sense**
  - See
  - Touch
  - Hear
  - Detect distance

- **Plan**
  - Use sensory information to decide on an action

- **Act**
  - Activate and move motors complete the plan
Hardware Resources: Brick, Sensors & motors

NXT Brick: the robot’s ‘brain’

Interactive Servo motors

Light Sensor

Sound Sensor

Touch Sensor

Ultra-sound Sensor
Hardware Resources: Electronics, Gears, Brick, Sensors, Motors & Connectors
The PBC Team At Work
Challenges

- Scheduling
- Parents’ Pressure
- Managing the demand from other students and schools
Our findings

- Increased problem-solving skills seen among participants and support members
- New interest in technology among teachers and students
- Some parents purchased personal robotic sets for children
- The “slow learners” dominated the programming aspect
- Students had fun doing topics which were perceived as difficult
- Students collaborated to solve very complex problems
- School with technology-savvy principal excelled
- School with strong community bonds were also outstanding
Next step

- Increase the use of robotics in all secondary schools
- Organize training in Robotics for secondary school teachers
- Provide more challenging kits for the teams that were involved in the pilot project
- Host the young innovators’ competition
The summary