SCIENCE AND TECHNOLOGY POWERED BY

LEGO® MINDSTORMS® Education

LEGO® MINDSTORMS® Education helps to reinforce students' understanding of science, math, technology and engineering. This program not only strenghtens their ablity to learn, students also become better at cooperating, communicating, and thinking independently. LEGO® MINDSTORMS® fits all ages and learning styles.

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1. **Robot Discovery Webquest**
   http://www.windarooss.qld.edu.au/WebQuests/Robot_Webquest/welcome.htm
   By completing this webquest you will have learned ...
   - **How robots are being used now**
   - **How robots may be used in the future and**
   - **How will robots change your life as you know it today**

2. **Robots Video**
   http://school.discovery.com/lessonplans/programs/robbie/ **(video on right)**

3. **Integrating Robotics with Math, Science, Language & Media Arts, and Social Studies**
   http://www.ceap.wcu.edu/houghton/EDELCompEduc/Ch8/robotics.html

4. **An Introduction to Robotics – Curriculum Ideas**
   http://schoolscience.rice.edu/duker/robots/whatiscurrobot.html

5. **Robotics Competitions in the U.S. - K12 Academics**
   http://www.k12academics.com/robotics_comp.htm

6. **Botball Educational Robotics Program – Integrates science, technology, engineering, and math with robotics**
   http://www.botball.org/about-botball/overview.php

7. **TheTech Robotics Classroom Activities**
   http://www.thetech.org/robotics/activities/page12.html

8. **BEST Robotics – Coach Survival Guide**
   http://www.bestinc.org/docs/Survival_Guide/coach_survival_guide.html

The word LEGO is derived from the Danish words "leg godt" which have a rough English translation of "play well".

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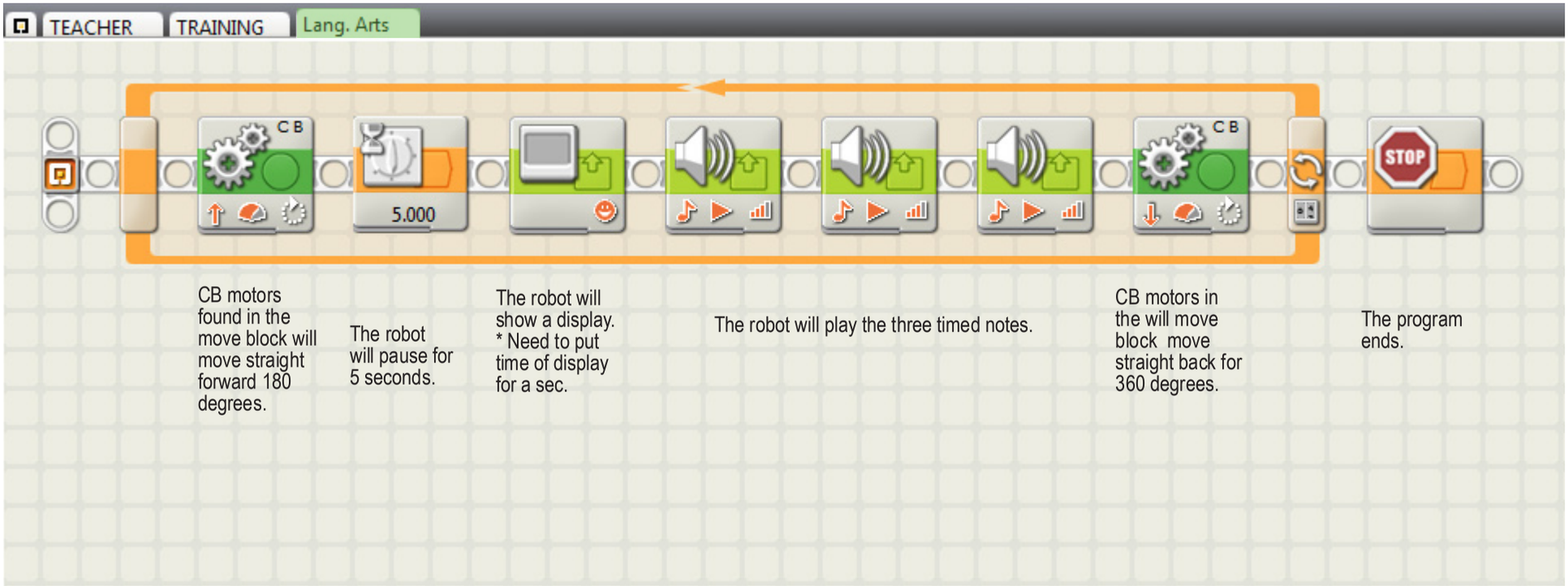
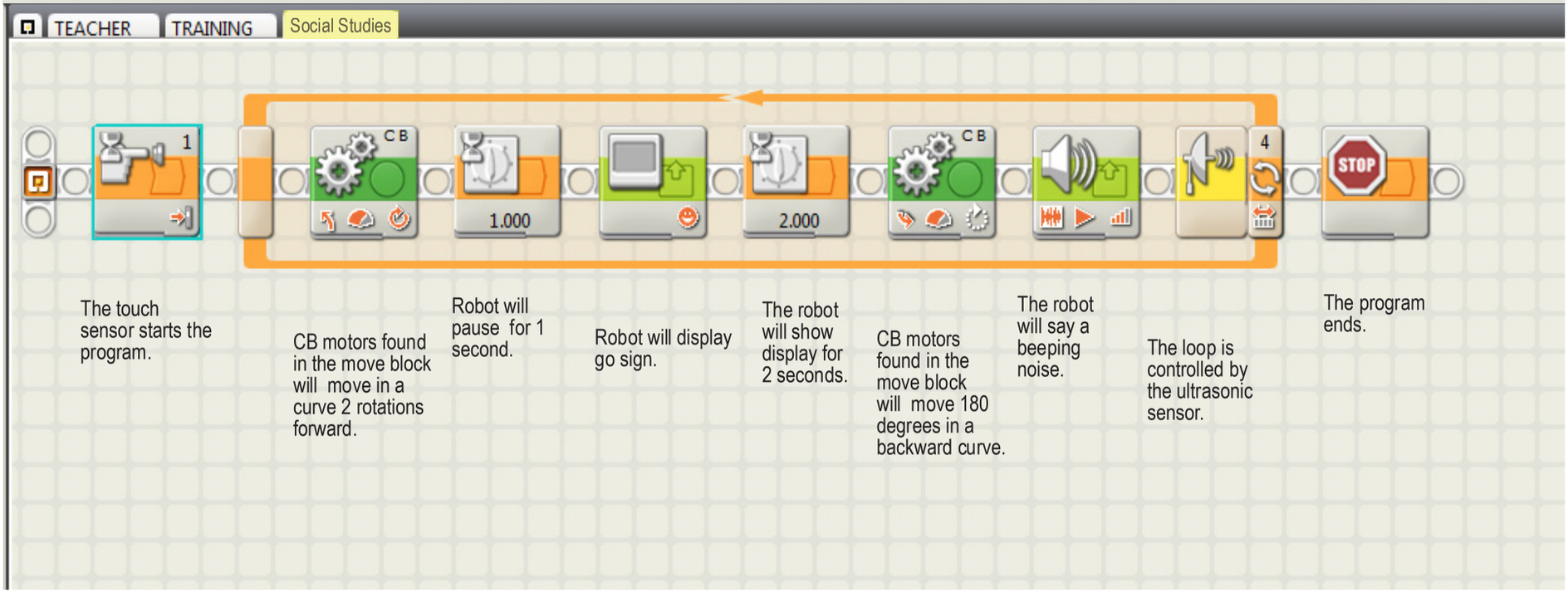




Language Arts

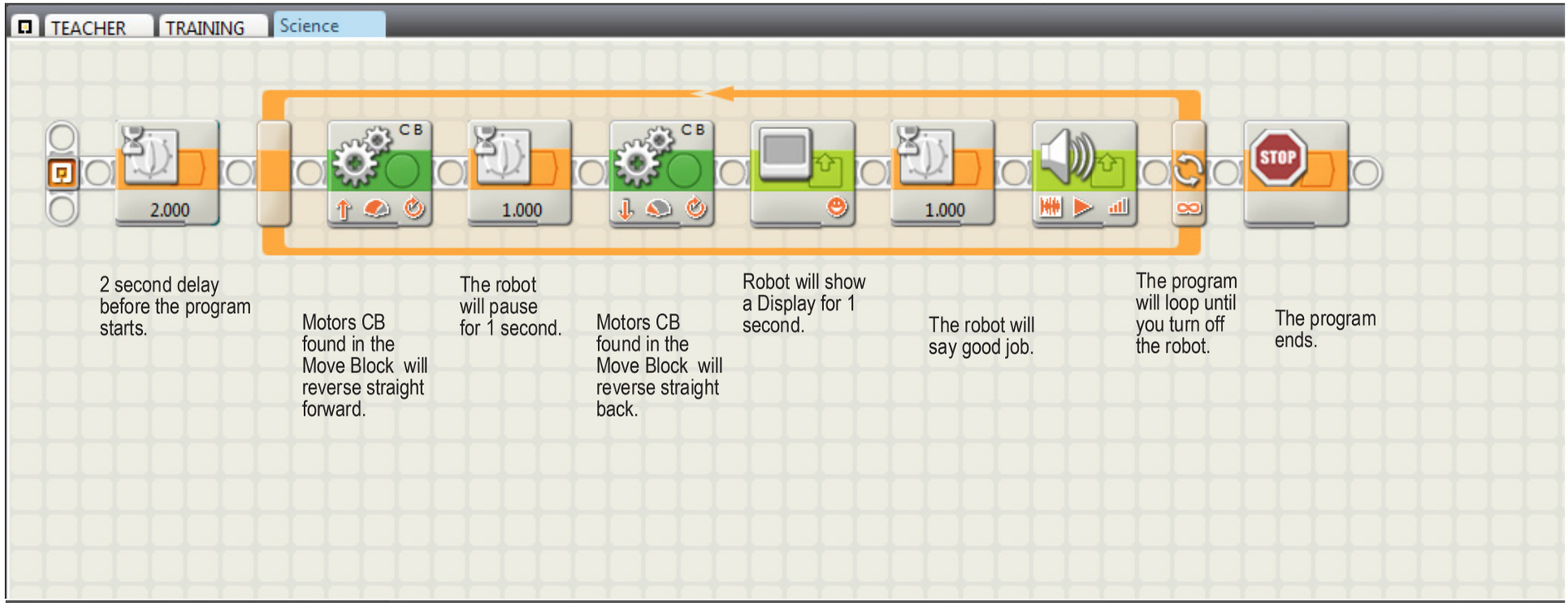
Reading, Writing, and Robotics Activities: (Ideas on the Fly)

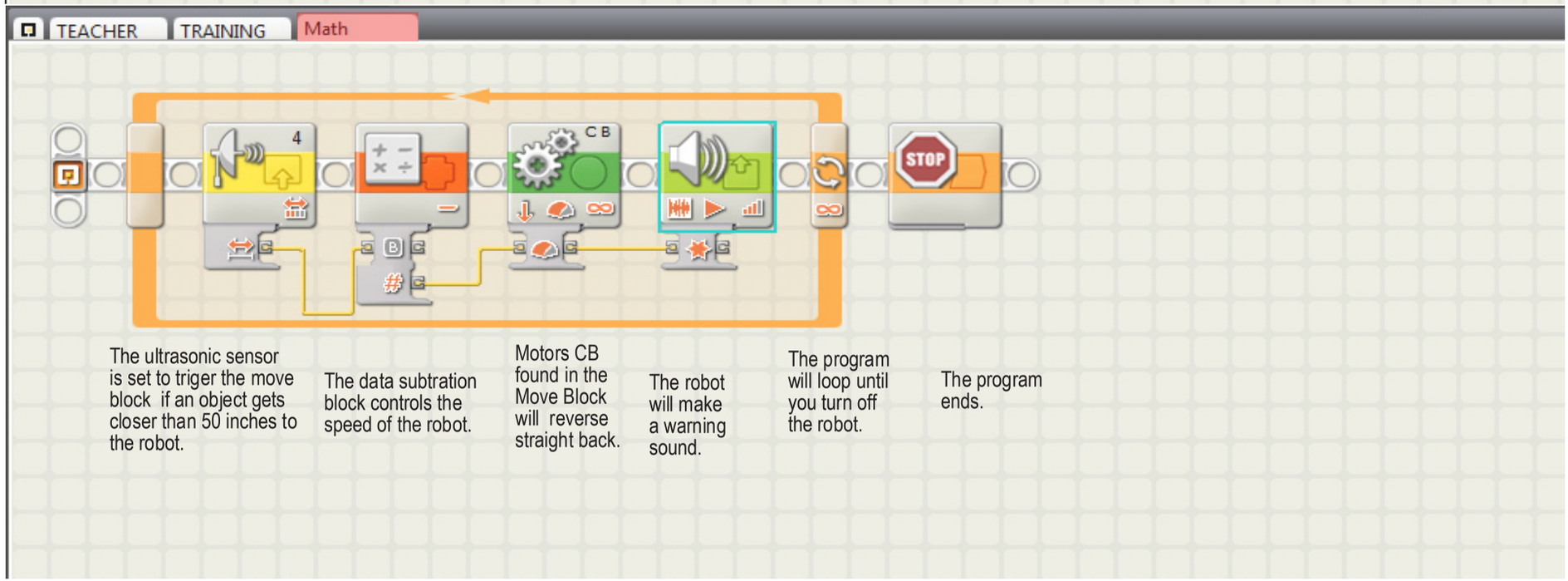
- Choose an article on “service-oriented robots” such as “Today’s Robots Are Designed To Serve” by Jeanie Croasmun, http://www.ergoweb.com/news/detail.cfm?id=888 and ask students to read it.
- Lead a discussion with students regarding what they have observed about how robots are helping people with disabilities.
- Instruct the students to design a robot that will solve a problem for people with disabilities.
- Afterward, have students write a persuasive paragraph on how the invention affects the quality of life in a positive way for those who have disabilities. Source: http://school.discovery.com/lessonplans/programs/robbie/ (Robots video)
- Read the article “ Hollywood’s Gadget Factories” http://query.nytimes.com/gst/fullpage.html?res=9C07E4DC1039F935A1575AC0A9649C8B63
- Design a robot with an idea of how it could be used in a movie.
- Plan the robot’s behavior using a Hollywood-style storyboard. Write explanations of how their inventions work using the form of a movie screenplay. Source:http://www.nytimes.com/learning/teachers/lessons/20020926thursday.html?searchpv=learning_lessons

Social Studies

How to bring Robotics into Geography and Social Studies:

- Community/Environment Activity
- a. Discuss with students what they have observed in their community that could be perceived as an environmental problem.
- b. Direct students to construct a robot that will address and resolve something they perceive as problematic (waste recycling, transportation, crime, etc.) or provide a service not previously conceived (interactive public entertainment and art spaces for community, etc.)
- c. Ask students to write an explanation of what the community problem is and how their robot could help to resolve the problem.
- Source: MIT Media Laboratory Research & Projects, “The City That We Want”, http://learning.media.mit.edu/projects.html
- Give students Longitude and Latidue coordinates and find locations with a Robot. (make a large map on the floor)





Science

How to bring Robotics into scientific studies: 1. Displacement, Density, and Buoyancy

a. Gather the following materials: ping pong ball, golf ball, rubber ball (same size), ruler, and a tub half-filled with water.
b. Build robots that will pick up and drop each of the balls listed above.
c. Have students measure the starting water line in the tub.
d. Instruct the students to program the robot to complete the following tasks with each of the balls:
e. Pick up ball
f. Transport ball to the tub
g. Drop ball into tub
h. Measure the new water line created by displacement
i. Discuss the displacement, density, and buoyancy that occurred.
j. Optional: Graph and document results.

2. Build a robot that uses speed and torque. Discuss the differences.

Math

How to bring Robotics into Math classes:

1. Mean, Median, and Mode
   a. Have students design a robot using a light, sound, or ultrasonic sensor.
   b. Get the threshold value by calculating the average (or mean) of the two values obtained by the sensor.
   c. Record the threshold values for all students' sensor in list format.
   d. Instruct students to calculate the median and mode using this set of numbers.
2. Finding Distance using the Circumference of a Circle
   a. Mark the start and end marks of a designated distance for the robots to travel. Measure this distance using the metric system.
   b. Measure the radius of the wheel.
   c. Use the radius to calculate the circumference of the wheel.
   d. Multiply the number of programmed rotations by the circumference to determine the distance traveled.
   e. Extension: Convert metric to inches and/or feet.
   f. Extension: Invert the question to find the diameter of the wheel by using the distance value and number of rotations.