**Problem:** We have an upcoming school book fair.  The librarian is concerned that our students are not as interested in books, since video games and movies are so readily available.  She has noticed that we are not selling as many books as we have in the past.  The money she makes from these books is used to buys things for our school library.  She needs your help!  She would like for you to help bring books alive for our students by creating a scene or character from a book and sharing how awesome your book is at the book fair!

**Lesson Summary:**  Create and program a scene or character from a book and share how awesome your book is at the book fair to generate interest in books and increase book sales.

**Major Topic and SOL:**
- English SoL (2010)
    - 5.1 The student will listen, draw conclusions, and share responses in subject-related group learning activities.
        - a) Participate in and contribute to discussions across content areas.
        - b) Organize information to present in reports of group activities.
        - c) Summarize information gathered in group activities.
        - d) Communicate new ideas to others.
        - e) Demonstrate the ability to collaborate with diverse teams.
        - f) Demonstrate the ability to work independently.
    - 5.2 The student will use effective verbal and nonverbal communication skills to deliver planned oral presentations.
        - a) Maintain eye contact with listeners.
        - b) Use gestures to support, accentuate, and dramatize verbal message.
        - c) Use facial expressions to support and dramatize verbal message.
        - d) Use posture appropriate for communication setting.
        - e) Determine appropriate content for audience.
        - f) Organize content sequentially around major ideas.
        - g) Summarize main points as they relate to main idea or supporting details. h) Incorporate visual media to support the presentation.
        - i) Use language and style appropriate to the audience, topic, and purpose.
    - 5.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction, and poetry.
        - b) Describe character development.
        - c) Describe the development of plot and explain the resolution of conflict(s).
        - g) Identify main idea.

- ○ h) Summarize supporting details from text.
- ○ i) Draw conclusions and make inferences from text. j) Identify cause and effect relationships.
- 5.9 The student will find, evaluate, and select appropriate resources for a research product.
    - ○ a) Construct questions about a topic.
    - ○ b) Collect information from multiple resources including online, print, and media.
    - ○ c) Use technology as a tool to research, organize, evaluate, and communicate information.
    - ○ f) Give credit to sources used in research.
    - ○ g) Define the meaning and consequences of plagiarism.
- Math SOL (2009):
    - ○ 5.8  The student will:
        - ■ d)  estimate and then measure to solve problems, using U.S. Customary and metric units; and
    - ○ 5.11 The student will measure right, acute, obtuse, and straight angles.
    - ○ 5.14  The student will make predictions and determine the probability of an

        outcome by constructing a sample space
- Science SOL (2010):
    - ○ 5.1  The student will demonstrate an understanding of scientific reasoning, logic,

        and the nature of science by planning and conducting investigations in which
        - ■ b)  estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
        - ■ c)  estimates are made and accurate measurements of elapsed time are made using proper tools;
        - ■ d)  hypotheses are formed from testable questions;
        - ■ g)  data are collected, recorded, analyzed, and communicated using

        proper graphical representations and metric measurements;
        - ■ i)  inferences are made and conclusions are drawn;
        - ■ j)  models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
        - ■ k)  current applications are used to reinforce science concepts.

**Length of Time:**  Six hour-long weekly sessions

**Student Objectives:**
- Students will demonstrate knowledge of Hummingbird coding by manipulating a SPRITE in SCRATCH programming offline.
- Students will demonstrate knowledge of Hummingbird robotics by automating simple functions.
- Students will work in a group to design and build a scene or character from a book.
- Students will work in a group to use robotics coding to automate their robot.
- Students will work in a group to present their Books Alive robot.
- Students will evaluate and reflect on their designs as a group and individually.
- Students will redesign, if desired.

**21st Century Skills**
- Critical-Thinking and Problem Solving
- Communication
- Creativity and Innovation
- Collaboration
- Information and Media Literacy
- Contextual Learning

**Assessment Evidence**
- Students will present their SCRATCH Program showing a SPRITE with at least 1 change of costume, location, and background.
- Students will demonstrate their physical model that shows an a Tri-Color light, sensor, and servo, with an accompanying wiring plan documentation
- Students will present their Books Alive robot.

**Supplies/Materials/Technology:**
- [Hummingbird Robotics Kits](#)
- [Loaded software](#)/Computers
- [Google Site](#)
- Various consumables (cardboard, construction paper, pipecleaners, tape, Velcro,)
- [Rubric](#)

Lesson 1: Intro to Programming with Scratch
- Discuss STEM and robotics
- Group mini-lesson giving an overview of functions
- Students open SCRATCH
- Students [mimic mini-lesson](#)
- Students free explore by programming their SPRITE to do things.

Support individuals as needed

Lesson 2: Building a simple, standard physical "flashlight"

- Group introduction to the model
  - Overviewing robotic pieces used (servo, light, sensor)
- Students build robot
  - Student mini-lesson on control board
  - Students wire the control board  (document the control board via the wiring plan)
  - Student mini-lesson on the specific coding features of the Hummingbird controller and SCRATCH code.
  - Students work in groups to code their robot

Lesson 3: Creating your own robot
- Reflection on lessons learned- questions, comments, concerns
- Safety Lesson
- Present the problem
- Students work in groups to plan, research, create, and program.

Lesson 4: Continuation of week 3

Lesson 5:  Present robots, reflect, discuss and elaborate!
- Group presentation, evaluation, and reflection
- Re-design

Lesson 6: Presentation of final projects