Bionic Biome Buckaroos

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Goals and Objectives

Common Core Standards
Mathematics:
Summarize numerical data sets in relation to their context, such as by:
a. Reporting the number of observations.
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
c. Giving quantitative measures of center and variability, as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science:
Define a problem from the middle school science curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions

Language Arts:
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, of technical processes.
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., flowchart, diagram, model, graph, or table).

Technology & Robotics:
Use technology to enhance the effectiveness of communication skills. Use database, spreadsheet, presentation software, scheduling, and integrated software packages to enhance communication.
Describe the role of sensors in the field of robotics.
Describe the various classification schemes of sensors applicable to robotics.
Build, program, and configure a robot to perform predefined tasks.
Solve problems using critical thinking skills, creativity and innovation.

Overview

Using the Lego Mindstorms Green City Challenge pack, the Vernier LEGO NXT STEM Environmental Science Package of environmental sensor/probes, and the *STEM with Vernier and LEGO MINDSTORMS NXT lab book*, students will work in cooperative groups to investigate environmental issues. The students will use robotics kits that were previously acquired, to connect technology to solving environmental concerns in the community.

First the students will participate in the training activities presented in the LEGO Mindstorms Green City Challenge pack and tutorials that are built in to the NXT Mindstorms software. There are seven training activities in the Green City Challenge pack. They focus on hands-on building, programming, experimenting and problem-solving. Each of the activities follow the LEGO Education's 4C approach: Connect (connect to the activity), Construct (construct their models), Contemplate (programming which includes testing and adapting), and Continue (improving and optimizing their robots' performance). In the training activities they learn to program the robots to drive forward, detect touch, detect distance, detect a dark line, hit a red ball, follow a line, and calibrate a sensor. Once they are done with the training and depending on available time, they could move on to do challenge missions what will simulate competitions with LEGO First.

Next, students will design, build and program robots to execute data collection activities with Vernier sensors. There are pH, conductivity (used to measure total dissolved solids in water), UVB, temperature, and soil moisture sensors. These sensors, coupled with the LEGO MINDSTORMS NXT intelligent interface, enable students to do traditional science labs in a new way. In addition, the robotics projects provide an opportunity to learn more about construction and engineering, while adding an element of fun to learning. Some topics that are covered in the *Stem with Vernier and LEGO Mindstorms NXT lab book* are: investigating water quality, UV radiation and sunscreen effectiveness, and managing garden soil moisture. The lab book has many beginning activities to learn how to use the sensors and several bigger projects to try.

Outline

The following is intended as an example. Alter as desired.

Week 1: Set up cooperative groups and review the instructions for the Green City Challenge Activities. Explain and review what will be required for journal and collaboration rubrics.
Weeks 2 – 8: Students will learn the basics of designing, building and programming the Mindstorms NXT robots using the *Green City Challenge Activity Pack which* includes seven easy-to-follow training activities (one per week), each supported by student worksheets, which guide the students from simple to more advanced programming. The training activities include investigations of speed, friction, simple machines, and scientific testing skills among others.
Weeks 9 – 15 (This could take more or less time depending on student abilities. Part of the time includes training on how to use the probes and program the robots to use them):

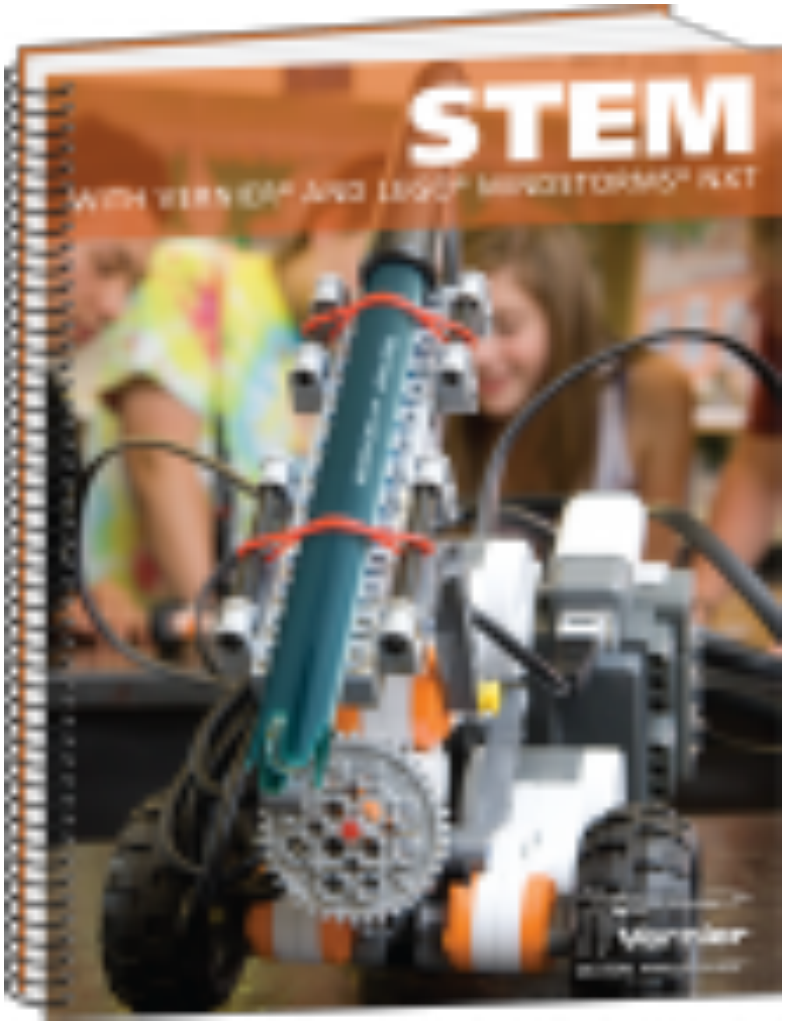
1. UV Light and Sunscreens Lab:
    a. In this lab, we will measure the amount of UVB light that passes through various sunscreens and compare it with the amount of UVB light from direct sun. We will then create advertisements to inform consumers of the most effective sunscreens.
    b. Students will:
        • Use a UVB Sensor to measure UVB light.
        • Determine the amount of UVB light allowed through 5 different sunscreens.
        • Analyze the relationship between UVB light and SPF rating.

2. Water Quality Labs:
    a. In this lab, we will take water samples from different areas in the community and compare their water quality. We will then create presentations to inform and make recommendations to the community.
    b. Students will:
        • Use a Conductivity Probe to measure the total dissolved solids in water.
        • Use a pH Sensor to measure the pH of water.
        • Make visual observations at the test sites.
        • Compare water quality.

Evaluation:

For all of the investigations, the students will use a science journal (digital if possible) to record their investigations. The journals are collected and assessed using an attached journal rubric as formative and summative evidence of their knowledge and skills of robotics and probe ware. There are activity sheets where students will record information and answer questions; these will be collected to be graded as formative assessments. In addition, there will be teacher made summative assessments of the different units.

An attached collaboration rubric will be used to assess group team work.



Sample Lesson Plan for Introduction (Alter as desired)**:**

Goals and Objectives:

Technology and Robotics:

Build, program, and configure a robot to perform predefined tasks.

Solve problems using critical thinking skills, creativity and innovation.

Language Arts:

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, of technical processes.

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., flowchart, diagram, model, graph, or table).

Collaboration:

Work effectively in cooperative groups or with partners.

Activities:

1. Use the "Starter Guide" in the Green City Challenge pack to present about:
    a. How to use the LEGO Mindstorms NXT software, Robot Educator Tutorials,
    b. The Programming Palettes and Programming Area,
    c. How to download Programs and Manage NXT Memory.
2. Divide the students into pairs or small cooperative groups depending on how many robotics kits there are. If there are two students you can use a technique called "Pair Programming". During pair programming, students work in tandem at one computer while completing regular programming assignments. The "driver" controls the mouse and keyboard while the "navigator" makes suggestions, points out errors, and asks questions. The partners routinely switch roles to gain the benefits of each role. If the students are in groups you could modify the Pair Programming method. A great place to learn about Pair Programming is http://www.ncwit.org/resources/pair-programming-box-power-collaborative-learning.

3. Give out the kits and have the groups use the building instructions from the LEGO MINDSTORMS NXT Building Guide that is included in the kit to build their robots (the software has tutorials for building the robots as well). Students should clean their area and put any unused parts back into the kit before beginning the programming part of the training activity.
4. Give out the student worksheets for the Drive Forward training activity sheet and have groups follow the step by step instructions to complete the activity (you could have one sheet for the entire group or one for each student or pair of students).
5. Walk around the room to observe how the students work in their groups and to give guidance when needed.
6. Students should be filling in the worksheet as they proceed from step to step.
7. Bring the groups together and have a whole class reflection of the activity.
8. Have students write/type in their individual Science Journals. Refer them to the Journal Rubric.

    The following prompts could be used:
    o What did you do?
    o What was most interesting to you?
    o What did you learn?
    o What do you hope to learn in the future during the project?
    o Include a diagram(s) to enhance your explanation.

Evaluation:

Use the Science Journal Rubric to score/grade the journal entries. Use the Collaboration Rubric to score/grade the team work behaviors.

After the introductory lesson, move on to the other training activities and follow the above steps in a similar fashion. Then move on to lessons from the *Stem with Vernier and LEGO Mindstorms NXT lab book* that you want to cover.

Sample lesson plan from the *Stem with Vernier and LEGO Mindstorms NXT lab book* (Alter as desired)***:***

I am using the CD that is included with the lab book to put the information for the lesson here.

UV Light and Sunscreens

Sunscreens are available in many different types and with many different levels of protection. The most common measure of protection from UVB light is the SPF factor. SPF, or sun protection factor, describes the increased amount of time you can be in the sun before your skin starts to burn. For example, a sunscreen labeled SPF 8 means that you can be out in the sun eight times longer before burning than you would without using any protection. Products range from SPF 0 to SPF 50 or higher. But is SPF 50 really twice as protective as SPF 25? You will perform an experiment that will help answer that question.

Figure 1 shows the location of UV light in the electromagnetic spectrum. Notice that the ultraviolet band is broken into three types, referred to as UVA, UVB, and UVC. The most harmful of these three, UVC light, is absorbed by the atmosphere and does not reach the Earth's surface. UVB light is responsible for many skin problems, such as sunburns and several forms of skin cancer. UVA light is deep penetrating and causes tanning, wrinkles, and some forms of skin cancer.

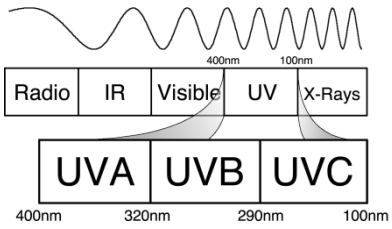


Figure 1

In this experiment, you will measure the amount of UVB light that passes through various sunscreens and compare it with the amount of UVB light from direct sun.

OBJECTIVES

In this experiment, you will

- Use a UVB Sensor to measure UVB light.
- Determine the amount of UVB light allowed through 5 different sunscreens.
- Analyze the relationship between UVB light and SPF rating.

MATERIALS

computer
LEGO NXT Intelligent Brick
two 4 x 6 index cards
coin (approximately 2 cm in diameter)

MINDSTORMS Edu NXT v2.0 software	scissors
Vernier NXT Sensor Adapter	tape
Vernier UVB Sensor	ring stand and utility clamp
NXT cable	stopwatch (optional)
selection of 5 sunscreens	graph paper
plastic wrap	

PRE-LAB PROCEDURE

1. Obtain the five different sunscreens assigned by your teacher.

2. In Table 1, fill in the SPF values, brand names, additional notes, and price per ounce.

3. Prepare your test cards.
   a. Obtain two 4 × 6 inch index cards.
   b. Using the coin as your guide, draw three circles on each test card in the locations shown in Figure 2.
   c. Use scissors to cut out the circles.
   d. On one test card, label the circle on the left as your control.
   e. Using both test cards, label the remaining five circles with the SPF values of your five assigned sunscreens. Move from left to right and begin with the lowest SPF value. Note: Your SPF values may be different from those shown in Figure 2.

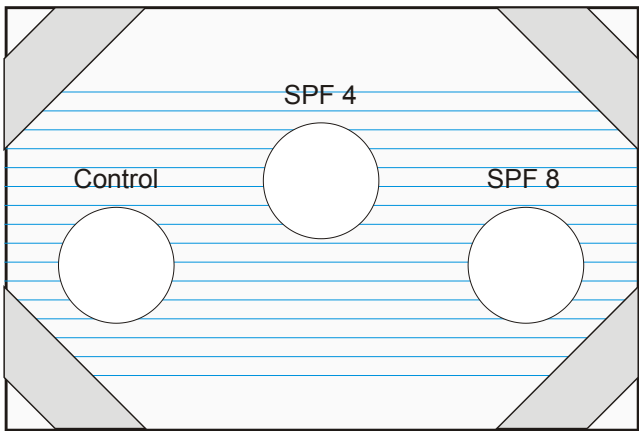


Figure 2

4. Cover the test cards with plastic wrap.
   a. Cut out a 4 × 6 inch piece of plastic wrap. The person who does this should have clean hands with no sunscreen or lotions on them.
   b. Lay the plastic wrap neatly on top of one of the test cards. Try to keep the plastic wrap flat so it is not wrinkled, but do not stretch it.
   c. Tape the four corners as shown in Figure 2.
   d. Repeat Steps a–c for the second test card.

5. Apply the sunscreens to the test cards.
   a. Place the first test card in front of you with the plastic side facing up.
   b. The circle labeled “control” should be kept clean. It will be used to measure the effect of

the plastic wrap by itself.

c. Starting with the sunscreen that has the lowest SPF, squeeze a very small amount of sunscreen on your finger.
d. Spread the sunscreen thinly and evenly over the appropriate circle on the plastic wrap.
e. Wipe off your finger well with a paper towel.
f. Repeat Steps c–e for all the remaining sunscreens.
g. Let the sunscreens dry.

Choosing a Data-Collection Method

- Method 1 requires that the NXT be connected to the computer while collecting data. This method should be used if you have a computer that can be taken outside, or a large open window in full sun.
- Method 2 allows you to disconnect the NXT from the computer for data collection. This method has the advantage of leaving your computer in the classroom, while taking your NXT outdoors.

PROCEDURE

Method 1: NXT Remains Attached to a Computer

1. Prepare the NXT for data collection.
   a. Connect the UVB Sensor to the Vernier NXT Sensor Adapter.
   b. Connect the Adapter to Port 1 on the NXT using a LEGO NXT cable.
   c. Make sure the NXT is connected to the computer (USB or Bluetooth) and turned on.
2. Launch NXT 2.0 Data Logging.
3. Click the Go button next to Start New Experiment.
4. Set up the experiment.
   a. In the Experiment Configuration Window, select Vernier UVB by clicking on the pull-down list to the left of Port 1. (Notice the indicator box changes from gray to green.)
   b. Adjust the Duration to 90 seconds.
   c. Click the OK button.
5. Use the shadow of the UVB Sensor to aim it correctly without looking directly at the sun.
   a. Hold the sensor with your thumb and first finger, pointing the sensor in the general direction of the sun.
   b. Find the sensor's shadow and observe how it changes shape as you move the sensor around.
   c. Move the sensor around until the shadow becomes a small round circle. This indicates that the sensor is now pointing directly at the sun.
   d. Keeping this sensor orientation in mind, clamp the UVB Sensor onto the ring stand as shown in Figure 3.
   e. Once the sensor is securely on the ring stand, use the shadow again to make final adjustments to assure that the sensor is pointing directly at the sun.

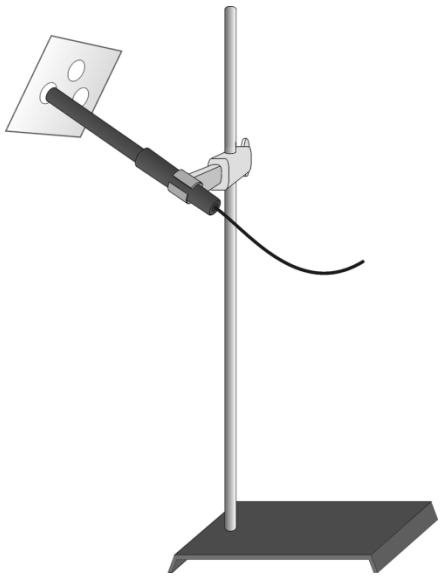


Figure 3

6. Practice holding one of your sample circles over the tip of the UVB Sensor. **Important:** The side with the sunscreen should be facing out, away from the sensor. Sunscreen should never come in contact with the UVB Sensor. It is okay if the plastic lightly touches the tip of the sensor.

7. When everything is ready, click the Download and Run button. Have the timer start the stopwatch when data collection begins.

8. Every 15 seconds, move the next sample over the tip of the UVB Sensor. Start with the Control sample with no sunscreen on it. Data collection will stop automatically after you have moved to all six samples, in 90 seconds.

9. Analyze the dataset.
   a. Under the Analysis Tools Button, select Section Analysis.
   b. Study your graph and identify the six 15-second sections.
   c. Drag the left and right edges of the gray strip until it covers the flattest part of the first 15-second section.
   d. Record the mean UVB value (in mW/m^2) in your data table.
   e. Drag the left and right edges of the gray strip for the other 15-second sections of the graph, recording the mean UVB value for each.

Method 2: Using the NXT Remotely

1. Prepare the NXT for data collection.
   a. Connect the UVB Sensor to the Vernier NXT Sensor Adapter.
   b. Connect the Adapter to Port 1 on the NXT using a LEGO NXT cable.
   c. Make sure the NXT is connected to the computer (USB or Bluetooth) and turned on.
   d. Launch NXT 2.0 Programming.
   e. Open the file 17 UV Sunscreen.rbt.

2. Examine the program you will be using. The program will log data for 90 seconds, while it

displays the UV sensor reading on the NXT screen. It will make a beep sound every 15 seconds during data collection.

3. Click the Download button (bottom-left corner of the NXT Controller). Note that this does not run the experiment, but stores the program in the memory of the NXT.

4. After the download is complete, disconnect the NXT from the computer.

5. Once outdoors, use the shadow of the UVB Sensor to aim it correctly without looking directly at the sun.
   a. Hold the sensor with your thumb and first finger, pointing the sensor in the general direction of the sun.
   b. Find the sensor's shadow, and observe how it changes shape as you move the sensor around.
   c. Move the sensor around until the shadow becomes a small round circle. This indicates that the sensor is now pointing directly at the sun.
   d. Keeping this sensor orientation in mind, clamp the UVB Sensor onto the ring stand, as shown in Figure 3.
   e. Once the sensor is securely on the ring stand, use the shadow again to make final adjustments to assure that the sensor is pointing directly at the sun.

6. Practice holding one of your sample circles over the tip of the UVB Sensor. **Important:** The side with the sunscreen should be facing out, away from the sensor. Sunscreen should never come in contact with the UVB Sensor. It is okay if the plastic lightly touches the tip of the sensor.

7. When everything is ready, press the Enter (square) button on the NXT to run the "UV Sunscreen" program. The NXT will beep and data collection will begin. Start with the Control sample with no sunscreen on it.

8. Every 15 seconds you will hear a beep. Move the next sample over the tip of the UVB Sensor. Data collection will stop automatically after 90 seconds, after you have tested all six samples.

9. Back in the classroom, upload the UVB data to the computer.
   a. Reconnect the NXT to the computer (USB or Bluetooth). Make sure the NXT is turned on.
   b. If it is not already running, launch NXT 2.0 Data Logging.
   c. Choose Open from the File menu.
   d. Highlight your NXT in the Browse Devices window. Be patient. It may take a few seconds for your NXT to appear.
   e. Highlight the Log File named "17 UV Sunscr.log." A graph will appear in the Log Preview window.
   f. Click the Open button. (Click OK if you get an Overwrite request.) Notice your dataset is stored in the table under the name of the sensor used to collect the data. The extension "_p1_1" is automatically added.

10. Analyze the dataset.
    a. Under the Analysis Tools Button, select Section Analysis.
    b. Study your graph and identify the six 15 second sections.
    c. Drag the left and right edges of the gray strip until it covers the flattest part of the first

15-second section.

d. Record the mean UVB value (in mW/m^2) in your data table.
e. Drag the left and right edges of the gray strip for the other 15-second sections of the graph, recording the mean UVB value for each.

DATA AND OBSERVATIONS

Table 1					
Sampling Time (sec)	SPF Value on Label	UVB (mW/m^2)	Brand name (e.g., Coppertone)	Notes on label (e.g., waterproof)	Price per ounce ($/oz)
0 – 15	0 (Control)				
15 – 30					
30 – 45					
45 – 60					
60 – 75					
75 – 90					

PROCESSING THE DATA

1. On a piece of graph paper, plot SPF values versus UVB light intensities (in mW/m^2). Study your graph. Describe its shape in relation to how the UVB light intensity changed with different SPF values.

2. According to your data, would a sunscreen labeled SPF 50 block twice as much UVB light as SPF 25? Explain why or why not.

3. According to your data, did the price per ounce or any other factors such as being "waterproof" have any effect on the UVB measurements? Explain.

Have students record data collection and data processing in their science journals. Instead of using graph paper, the students could use Microsoft Excel to create their graphs. Also have the students use the following prompts to write in their journals:

o What did you do?
o What was most interesting to you?
o What did you learn?
o What do you hope to learn in the future during the project?
o Include a diagram(s) to enhance your explanation.

These lessons are very involved and can take several class periods to complete. The *Stem with Vernier and LEGO Mindstorms NXT lab book* also has shorter experiments using the various probes and the LEGO Mindstorms NXT software has tutorials and activities on using probes.

Evaluation:

Use the Science Journal Rubric to score/grade the journal entries. Use the Collaboration Rubric to score/grade the team work behaviors.

Resources

For my project, I used the following materials and resources. Depending on the funding received, you may have to alter the amounts:

Vernier LEGO NXT STEM Environmental Science Package

Each package includes an interface and sensors for a lab group of 2 to 4 students.

Sensors: 2 NXT Sensor adapters, 2 Stainless steel temperature probes, 1 pH sensor, 1 UVB sensor, 1 Conductivity probe, and 1 soil moisture sensor. The package contains all the sensors needed to perform the projects and experiments in the STEM with Vernier and LEGO MINDSTORMS NXT lab book.

http://www.vernier.com/products/packages/engineering-nxt/environmental/

STEM with Vernier and LEGO MINDSTORMS NXT Lab Manual

The book includes 14 lab activities and 4 design-and-build robotics projects. All the activities involve collecting data with Vernier sensors, primarily pH, Conductivity, UV, and Soil Moisture Sensors. These sensors, coupled with the LEGO MINDSTORMS NXT intelligent interface, enable students to do traditional science labs in a new way. In addition, the robotics projects provide an opportunity to learn about construction and engineering, while adding an element of fun to learning.

http://www.vernier.com/products/books/stem/

LEGO Green City Challenge Combo Pack

The Green City Challenge Combo Pack includes both the Green City Challenge Set and Activity Pack. The Green City Challenge Set contains three training mats, a challenge mat, and more than 1,300 elements for building models, such as a power plant, wind turbine, and dam. The mats provide a field where students can test and practice their programming skills.

The Green City Challenge Activity Pack includes seven easy-to-follow training activities, each supported by student worksheets, which guide the students from simple to more advanced programming. Students are then challenged to apply their programming and problem-solving skills by making their robots solve real-world engineering challenges related to renewable energy. Also includes a project that can be used for further research into the challenge topic of renewable energy.

http://www.legoeducation.us/eng/product/green_city_challenge_combo_pack/2045

LEGO Mindstorms Education NXT Base Set

This set enables students to build and program real-life robotic solutions. Contains 431 elements including the programmable *NXT Brick*; three interactive servo motors; ultrasonic, sound, light, and two touch sensors; a rechargeable DC battery; a DC charger; connecting cables; and full-color building instructions.

Provides cross-curricular opportunities in science, technology, engineering, and math

Allows for creativity in design

Enables students to explore the world of engineering by building complex control systems

http://www.legoeducation.us/eng/product/lego_mindstorms_education_nxt_base_set/2095

LEGO Mindstorms Education NXT Software 2.1

This powerful, easy-to-use software for programming and data logging is icon based and incorporates Robot Educator, a step-by-step guide with 46 tutorials, from beginner to advanced levels. Data-logging functionalities, including a graph viewer, make it easy to collect and analyze data from sensors. The software incorporates a comprehensive digital user manual. The software is Mac OS X, Windows XP, Vista, and 7 compatible.

http://www.legoeducation.us/eng/product/lego_mindstorms_education_nxt_software_2_1/2240

Contact information of the LEGO Education representative for Florida:

Dustin L Rhodes | Education Technology Consultant |
Toll Free: 866.418.5346 | Fax: 620.231.4767
drhodes@LEGOeducation.us | www.LEGOeducation.us

RUBRICS - These are on the following pages.

Science Journal Rubric

Student Journals will be assessed for:

In general, journals will be assessed for overall quality, completeness, accuracy, effort and communication of your thoughts and work in all lessons. Use the rubric below for more specific grading information.

Name_____

Journal Demonstrates:	**Developing 1**	**Proficient 2**	**Exemplary 3**	**Score**
Quality Writing	- Organization or neatness needs attention - Uses little scientific vocabulary - Notes/Explanations are incomplete	- Ideas are somewhat organized and neat - Occasional use of Scientific vocab. - Notes/Explanations are not totally complete	- Organized, neat, well thought ideas - Scientific Vocabulary - Detailed, descriptive, complete notes/explanations	
Understanding of the steps and skills of the scientific method and inquiry.	- Some steps of lab identified correctly - Explanations are not accurate/clear	- Most steps of labs identified correctly - Mostly accurate explanations	- All steps of labs identified correctly - Accurate explanations	
Use of diagrams & illustrations to communicate ideas	- Not totally accurate - Missing quite a few labels - Not too neat	- Accurate but not complete - Some labels - Neat	- Accurate and complete - All Labels - Neat	
Understanding of information	- Explanations not too accurate or missing info. - Questions not relative or showing much thought	- Mostly accurate explanations - Questions apply but do not show much creativity	- Accurate scientific explanations Able to generates unique questions that relate	
Extended thinking	- Not too many examples of creative, individual thinking - Did not meet all the minimum requirements of the lesson	- Has some creative examples of individual work and ideas. - Did the minimum requirements for each lesson	- Has many examples of individual & creative ways of thinking of information i.e. unique questions, illustrations, observations, Problem-solving descriptions, ideas for projects or experiments, etc.	
			Total	

Collaboration Rubric

Name _____

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Share Information	Does not relay any information to teammates.	Relays very little information--some relates to the topic.	Relays some basic information--most relates to the topic.	Relays a great deal of information--all relates to the topic.	
Be Punctual	Does not hand in any assignments.	Hands in most assignments late.	Hands in most assignments on time.	Hands in all assignments on time.	
Fulfill Team Role's Duties	Does not perform any duties of assigned team role.	Performs very little duties.	Performs nearly all duties.	Performs all duties of assigned team role.	
Share Equally	Always relies on others to do the work.	Rarely does the assigned work--often needs reminding.	Usually does the assigned work--rarely needs reminding.	Always does the assigned work without having to be reminded.	
Listen to Other Teammates	Is always talking--never allows anyone else to speak.	Usually doing most of the talking--rarely allows others to speak.	Listens, but sometimes talks too much.	Listens and speaks a fair amount.	
Cooperate with Teammates	Usually argues with teammates.	Sometimes argues.	Rarely argues.	Never argues with teammates.	
Make Fair Decisions	Usually wants to have things their way.	Often sides with friends instead of considering all views.	Usually considers all views.	Always helps team to reach a fair decision.	
				Total	

The Education Fund's

Adapter Grant Application

M-DCPS teachers, media specialists, counselors or assistant principals may request funds to implement an IMPACT II idea, teaching strategy or project from the Idea EXPO workshops and/or curriculum ideas profiled annually in the *Ideas with IMPACT* catalogs from 1990 to the current year, 2013-14.

Most catalogs can be viewed at The Education Fund web site at www.educationfund.org under the heading, Publications. How-to booklets for each idea can be accessed at www.educationfund.org under Publications. They are listed under Curriculum Idea Packets.

- Open to all K-12 M-DCPS teachers, counselors, media specialists
- Quick and easy reporting requirements
- Grants range from $150 - $400. **ROBOTIC grants up to $500.**
- Grant recipients recognized at an Awards Reception in late January.

To apply, you must contact the teacher (the Disseminator) who developed the idea. Contact may be made by attending a workshop at the Idea EXPO given by the IMPACT II disseminator teacher.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by June 15th.
APPLICATION DEADLINE: December 10th.

Apply online at www.educationfund.org.

For more information contact:
Lorna Pranger Valle
The Education Fund
305-892-5099, ext. 18;
Lvalle@educationfund.org