EDTC 5630 ROBOTICS IN THE CLASSROOM **July 9, 11, 16, 18, 23, 25**
5:00 – 9:00 p.m. beckmann@webster.edu
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Week 2

Overview this week: we'll complete short presentations from last week and our discussion of robots in space, move into solar power and robots that work in dangerous conditions in the real world, create the Gobblebot w/ switch, discuss morphing, alternative methods of purchasing supplies for robots, and incorporating robotics into content areas.

1. Complete the presentations
2. Visit this site for a complete lesson plan on robots in space - http://athena.cornell.edu/educators/lp_06.html
3. Scavenger hunts and worksheets - *on and off line – work in groups – no need to submit but you will be asked to share your thoughts*

Sample A: w / Internet: *Access a web site to answer questions:*

Go to this site and answer the following questions:
http://www.occdsb.on.ca/~proj4632/what_would_you_like_to_kno.htm

a. What is the hardest thing for a robot to do?

b. Robots are made up of what three elements?

c. Where did the word 'robot' come from?

Sample B – w / o Internet: *Create your own worksheet using books from a library or bookstore:*

Use your text that came with the robot kit to answer the following questions:
a. In 250 B.C., Ctesibius of Alexandria contributed to the history of robotics how?

b. In 1923 who coined the word 'robot' and what was the name of the play?

c. What are the three laws of robotics in Asimov's book?

d. What was the name of the movie in 1926 that portrayed robots in the year 2026 and what was the robots name?

e. In 1977 what robots stared in George Lucas' movie - what was the movie?

f. What type of robot was launched aboard the space shuttle Columbia - what year?

g. What was the name of the first robot to be able to walk up stairs and when was it?

h. When was the first operation using robots?

i. In 2001 the first heart bypass operation was performed in the UK using a robot surgeon – what was the name of the surgical system?

4. Create a hands-on activity or exercise worksheet for any age group – submit this please – work in groups – one page, list the web site if you're using the Internet to create your worksheet - list the pages in your text if you're using your text to create the worksheet

Visit the following links for ideas and web sites if you want to create a scavenger hunt
http://www.occdsb.on.ca/~proj4632/kidsrobotquiz.htm - multiple choice
http://www.42explore.com/robots.htm - describe robots and give examples of where robots can be found in the everyday world
http://www.mos.org/exhibits/robot/activities-pre.html - what are the characteristics of a robot

Worksheet ideas might be as simple as creating a word search puzzle -
http://puzzlemaker.school.discovery.com/ - come up with a list of robotic terms or use the ones from Week 1

5. Solar - When energy from the sun is used to create power, we have solar power

- **Solar beads**
- **Solar project**
- **Activity:** In small groups go to the Internet and search for solar projects. Locate one solar kit / project and when it is your turn, give a short description of the kit, where it is on the Internet, and the price – this does not need to be submitted – go here for ideas - http://www.solarbotics.com

6. Robots performing dangerous jobs - Last week we created a robot fashioned after Spirit and Opportunity, the bots on Mars.

This week we will discuss and create a robot that works in dangerous conditions, keeping humans safe – the Gobblebot makes for a good discussion and method to explain to students how robots work in the real world to help man.

a. See pages 6, 9, 10, and 11 in your text that came with the kit
b. Pass out additional parts and create the **Gobblebot**

7. Morphing –
Morphing is not really energy or a robot, although robots are often used to demonstrate morphing. Morphing is really motion – it is included in our robotics class because of it's popularity and misconception by students that morphing is robotics.

a. Go to this site – morphing examples http://www.morpheussoftware.net/

b. Morphing balls
c. Morphing activity
http://pbskids.org/cyberchase/parentsteachers/lessonplans/lesson7.html
d. Technology, morphing, and math –
http://pbskids.org/cyberchase/parentsteachers/lessonplans/lesson7handout.pdf

8. Purchasing options for incorporating robotics into classrooms:

How to build the Bounce Bot if you don't have the kit

- order one separately from The Commotion, Ltd.
- purchase the entire kit from a book store, duplicate one from the kit and buy cardstock
- purchase TechCard individually or card stock from another source then purchase other items separately

If building from scratch you'll need rulers – imperial and metric

- http://www.printmini.com/printables/rulers/index.shtml – US Measurements
- http://convert.french-property.co.uk/ metric conversion charts
- http://www.vendian.org/mncharity/dir3/paper_rulers/ paper printout metric rulers

Options / ideas / suggestions for cost-effective robot building

- Examine the catalog from Commotion and discuss various types of projects that can be made from TechCard
- Examine TechCard projects catalog
- http://www.techcard.co.uk/pages/pubs.html TechCard distributed by The Commotion Group and the site for 'How Things Work' – scroll down to see products that can be ordered here as well as through The Commotion Group catalog
- Discuss how to order overseas using FAX numbers – i.e., The Commotion Group
- Examine various outlets for purchasing robotic supplies and how to build a basic chassis from heavy card stock paper using the template, create wheels using hole punches, and add axils and gears – use scoring tools and hole punches - or purchase the items individually. (Most items can be purchased from Art Mart, Michaels, Office Max, or any arts and craft stores, hobby shops do not carry many of these types of supplies any longer.)
- To order a catalog from 'The Commotion Group' click on the link below, click on 'contact us,' and fill out the form. Make sure the first item is selected - the box next to 'Please send me your Technology - Solutions For Education Key Stages 3 & 4 2003 Catalogue.' http://www.commotiongroup.com – click on 'contact'
- http://www.education-and-hobbies.co.uk/cgi-bin/newshop/shop.cgi?id=16138818 Education and Hobby Store Online
- http://www.solarbotics.com Solar bot supplies

Robot suggestions by age groups

- K to 2nd - **Lego robots** with movable parts and / or micro robots but with no batteries or motors
- 3rd to 4th - **Balloon vehicular bots** for 3-4, chassis, wheels, and balloons
- 5th to high school - **Bounce Bots, programmable string bots**

9. Integrating robotics into content areas:

Content that can be incorporated into robot building is endless – individually choose a subject from the list below (you'll use this subject as the basis for searching activities and for your final project – you may change your mind as the class progresses) – i.e. creating a robot has been incorporated into the following subjects: speech (oral presentations), portfolios (writing, vocabulary, English), literature, social studies, history, mythology, geography, science, math, physics, current events, health, storyboarding, technology, music, PE, etc.

Basic content areas and benefits of robotics in the classroom:

Electronics: Creating movement – adding motor and batteries and switches – what movement involves and basic principals behind movement

Electronics / Technology: Making it 'pretty' and 'functional' – adding lights, sensors, line-followers (basic robotics 'jobs' for robots to perform)

Presentations and Demonstrations: Students will demonstrate what they've created, cite the standards and curriculum content of their project, how they plan to assess and use the lesson in their classrooms

Science & Physics: robotic vehicles on Mars - why are they sent there, what are the expectations, how do robots react to the environment – the value of gears, ratios, wheels, pulleys and fulcrum – push and pull.

History: robots and their uses throughout time – earliest robots, what the words 'robotics' and 'robot' mean today, robots in Hollywood, robots in everyday life - particularly in industry - why people use robots - on the job 24/7 and they never get sick, etc. etc. Students should be able to look at the book that came with the kit or research on the Internet to find robot uses.

Math: metric measurement, conversions, currency exchanges for robotic parts

Journaling, English, Vocabulary, Writing/Reporting, Oral presentations: have students journal their progress – or robots on Mars – write – compare and contrast - draw a robot, give it a job to do, create their own in their mind before creating a Lego robot

Technology: use the digital camera to take pictures or secure a video cam to one of robots as it races around the room – use a spreadsheet for measuring progress if they readjust the axels, gears, etc.

Art / GEORGRPHY / SCIENCE: create a landscaped maze, an obstacle course, a floor map, create the landform or a landscape using paper, or build a maze out of wood or clay, create a town, city, give the robots antennae and eyes, draw flames with markers, or use stickers and decals.

Basic Electronics: include safety of working with tools - besides cutting and gluing there are batteries, motors, wires, etc. that need to be connected properly, buzzers and lights can be added to the finished products, propellers, motors, shafts, gears, switches, etc. can be introduced

Combining / incorporating other discipline areas (more involved) into robotics:

Robots increase **technology** skills in many areas including word processing, researching and searching, spreadsheets and graphing, digital cameras, scanners, presentations, computerized drawing, and programming. Using a robot can assist students in building and improving **vocabulary** skills, and improve **writing and oral presentation** which would involve demonstrations.

Robot building may improve and enhance **social skills, diversity,** and incorporate learning **communities** within the school setting as students work in groups to complete a project.

Concerning **data management** and **probability,** robots will assist students in predicting the results of data entered, in comparing experimental results with predicted results, and in understanding that events will occur in a specific sequence.

In **science** robots may help demonstrate a theory, explore landforms and geological maps; in *physics* robots assist in understanding concepts such as force, torque, energy, pressure, velocity, Bernoulli, lift, drag, and lift and drag.

In **math** robots may be used to test an algebraic formula or compare ratios, develop word problems based on elements of design, proportions, conversions, and scales, discover geometric patterns and solve puzzles, use mathematical language to describe geometry ideas, measure angles using a protractor.

In **history** robots can be used to recreate an invention or a famous building or timeline.

In **English** robots can be a story, a book, or a journal.

In **communication** robots can assist students in oral speaking through demonstrations and discussions of problems related to robot creation and further assist as solutions are presented in oral discussions.

In **music** robots can be programmed to play music, speak or sing.

In **physical education** robots can demonstrate speed and maneuverability.

In **art** robots can stimulate creativity and design when students draw designs and redraw when miscalculations or flaws are recognized

In **general** robots can assist in comparing and contrasting patterns and describing similarities and differences, and sequencing and learning what comes next for the Pre-K, K, 1st , and 2nd grade students as well as assist the older students in recognizing the need for precision in reporting results of specific situations. ~