EDTC 5630-01 ROBOTICS IN THE CLASSROOM **July 9, 11, 16, 18, 23, 25**
5:00 – 9:00 p.m. beckmann@webster.edu
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WEEKS 04, 05, and 06

1. Wind and propellers advanced - – continued from last week –
    a. Build the wind/propeller electric motor with lights and buzzers - **Different batteries – will it make a difference?** Will it go faster if it has two AA batteries vs. two AAA batteries?
        i. **You do not need to submit the Excel spreadsheet – it is for your benefit only**
        ii. Gather in small groups
        iii. You'll be given a baggie with everything you need to create a propeller bot at least two or three different ways.
        iv. Some baggies contain different sized batteries (AA vs. AAA) and others contain different sized wheels (40mm, 50mm, and 60mm), and some contain different size motors – all contain a light and buzzer.
        v. This is a multi-part exercise – connect buzzers and lights, use various parts to change speed and distance traveled, and troubleshoot.
        vi. You will create your bot as many different ways as possible using ALL the parts in the baggie. Determine which pieces work best – examine the parts that make the car go slow, fast, straight, crooked, etc. etc. - this will help you become adept at troubleshooting and help you anticipate problems. Use as many parts in the baggie as possible, but not all at the same time.
        vii. Create and mark start and finish lines outside in the hallway using the tape measure and masking tape – everyone will use the same start and finish lines.
        viii. We will share results when this activity is completed – if you finish before others work on your final or visit the links or search for links that would work for downtime activities.
        ix. Things to think about – what did you discover - visit the links below:
        x. Concerning batteries, would voltage make a difference?
        xi. Is there a difference between AA or AAA batteries?
        xii. For information on batteries and wheel rations, click on the following links:
            1. http://www.rahq.com/images/batteries_101/Batteries_101.htm
            2. http://www.pbs.org/teachersource/mathline/concepts/neighborhoodmath/activity4.shtm

2. Grouping students via learning and teaching styles , self – quizzes – make one up and have them take some serious and then some fun ones - The best way to group is to know your students – the best way to know your students is to give them learning style quizzes – fun and easy and quick - You don't want to have pairs of kids or kids sitting next to each other in a robotics class if both are linguistic or if both are spatial because they can't help each other and they'll run you ragged trying to figure out how to turn the robot in the right direction to glue the next piece, or how to paperclip the pieces together. So determine how your students learn and pair them up accordingly.

    a. In robotics you will want to group your students as they're building their robots but not when they decorate or race.
    b. There are three main learning styles: visual, auditory and kinesthetic. Most educational experiences cater to only one of the three main learning styles – visual. In a school, everything is highly visual, catering to the visual learner – neat and organized - writing and drawings on display. Teaching is usually accomplished with charts and graphs. Those who learn best by listening or through a physical modality are out of luck. Robotics is a change for these people to shine!
    c. If a student wants to improve and expand their learning capabilities, recognizing how one learns is the first step. If an educator wants to improve their teaching capabilities, realizing that how they learn is most likely the way they teach is the first step to learning how and when to modify teaching strategies.
    d. When learning about counting, for example, a physical learner may need to use blocks, an abacus, or other concrete materials to practice the new concept. A visual learner will grasp the

material more quickly by watching his teacher solve a problem in front of him. An auditory learner will remember the information if he can listen to the teacher explain it and answer his questions.

e. Become knowledgeable. Recognize your learning preferences and that will assist you in recognizing your teaching preference and assist you in modifying if / when necessary.
f. These learning styles aren't just speculative – studies have shown that when accommodating learning styles, an improvement in learning is increased significantly. In early 90s the U.S. Department of Education utilized learning styles as a strategy to improve test scores on national tests for special education students.

"There are probably as many ways to "teach" as there are to learn." We are primarily concerned with linguistic and visual for robot building because we're concerned with how students are best able to follow directions – words or pictures?

- http://www.metamath.com/lsweb/fourls.htm - styles explained
- Take a self-test to determine how you learn, study, and take in information http://vark-learn.com/english/index.asp Click on 'questionnaire' at the top, right.

Examine individual learning styles – visit some of the following links:

- "tactual-kinesthetic learners" --"tactual" for touch, "kinesthetic" for movement) discover the world best when they're using their hands or bodies - feel things with the hands http://www2.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/ilsweb.html 44 questions
- http://www.ldpride.net/learning_style.html 30 questions
- http://www.ldpride.net/learningstyles.MI.htm#Multiple%20Intelligences%20Explained - seven types of multi intelligences
- http://www.myjellybean.com Fun quizzes for teens and adults (suggestive content & pop up ads)
- http://www.dushkin.com/connectext/psy/ch11/survey11.mhtml locus of control site

Suggestions for grouping when building robots

- Three to a group is ideal but four might be better in case one student is missing, then other three can continue
- Assign jobs and monitor often - for building and researching the following job responsibilities might work – writer (using computer and helping the researcher find pertinent items), researcher (using computer), two builders – the writer and the researcher will act as 'foreman' for the two builders when the time comes to build and until that time the two builders will take inventory of parts and label items.
- For the finished product assign job responsibilities to individuals but ungroup - have a timekeeper and hand over the stop watch – another might stand at the finish line, another at the start line and both communicate to the student with the stop watch – another might be the notetaker

3. Kits – compare clock kits
   a. Robots are more than moving chassis-based vehicles, animals, etc. – robots can have just one moving piece, a mechanical arm, for example. There are many kits that contain projects with gears, solar energy, hydraulic arms, etc.
   b. Since many come from overseas, how do you judge the package for the appropriate school / age level when one country may have different levels of grades?
   c. Examine the set of instructions
   d. Where do you find kits? Just as for solar kits but this time use keywords such as "kits +children" or "classroom electronic kits"
      - http://scientificsonline.com/product.asp?pn=3081888&sid=OVERTURE&EID=OVT0241&OVRAW=clock%20kits%20+kids&OVKEY=clock%20kid%20kit&OVMTC=standard&bhcd2=1087345680 Clock kit
      - http://www.toys2wish4.com/craftkits.html Craft kits for all ages
      - http://robotikitsdirect.com/ Robot kits
      - http://www.yostengineering.com/index.cgi?section=Hardware&subsection=BugBrain/BugBrain.html Create a spider robot

4. More advanced bots - programmable - intro
    a. build the string programming robot from the kit
    b. discuss how you can use this bot in class – i.e. character education – patience, or following directions, etc.

5. **The final project** - you and your group will be the 'teacher' – the rest of the class will be your 'students' – you will create a lesson that involves building a robot, include curriculum topic, method to assess that you will explain to your 'students' - there will be no robot building, we will pretend only
    a. Build a robot or choose one that was already created but make sure it works – you or a member in your group will demo the robot for the final
    b. Create an assessing rubric or checklist – discuss assessing from last class
        i. Assessing: http://www.renfrew.edu.on.ca/grassroots/gr_alx/Rubrics.htm This site has two rubrics on it
        ii. http://www.renfrew.edu.on.ca/grassroots/gr_alx/challenges.htm following a class building robots
        iii. Remember to evaluate for aesthetics and design and function and if content topic is working as planned.
        iv. Kindergarten ideas for a rubric
        - 4 – WOW – The student exceeded the expectations for the science framework addressed, usually by doing extra work beyond the GOT IT requirements.
        - 3 – GOT IT – The student fully meets the expectations for the science framework addressed.
        - 2 – NOT YET – The student's work indicates understanding but the work does not meet all the requirements for the science framework addressed.
        - 1 – TRY AGAIN – The student's work does not indicate understanding.
        - 0 – NO EFFORT – Absent, Nothing turned in, etc.

    c. Create a lesson plan – make sure a topic is involved (i.ee math, reading, science, etc.)
    d. Create one activity
    e. Search for a second activity on the Internet
    f. Assign responsibilities for each member in your group (i.e. who will be the main presenter, who will demo the robot and explain the reason for the bot and what it is supposed to do, who will handout and explain the activities, who will explain the assessment procedure, who will explain the lesson, etc.)
    g. Presentations begin on night six – last night of class – at least 10 minutes, no longer than 20 please

REFERENCES

- Greene, P. J. "Lego Mindstorms Robolab." Learning & Leading with Technology **27**(8): 64.
- O'Neil, J. (1995). On technology in schools: A conversation with Chris Dede. *Educational Leadership*, 53(2), 6-12.
- Papert, S. (1980). *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books.