Lesson Plan

***Course Title**:WeDo 1*

Lesson 3:

Instructional Purpose (objectives):

- Build the "Hungry Alligator" using WeDo components.
- Program the "Hungry Alligator" using WeDo programming language
  - Incorporate a motion sensor as an input device
  - Modify the program to control the alligator's behavior
- Understand how the Hungry Alligator's program is similar to and different from a real alligator brain.

Key Vocabulary:

Program – a set of instructions that tell the robot what to do

Sensor – a device that detects a change in something (motion, angle, light, sound, etc)

Materials/Resources:

WeDo Kit, WeDo Software, WeDo Activity Pack 1.1 Software, paper, markers, scissors.

A.V. Equipment: Projector, Digital Camera

Computer Lab: _yes__ Days __every day_____

INSTRUCTIONAL STRATEGIES FOR GIFTED LEARNERS	
ENGAGED STUDENTS IN: • **Problem solving** ☑ Brainstorming ☐ Defining problems ☐ Identifying and implementing solutions • **Critical Thinking** ☐ Making judgments ☑ Comparing and contrasting ☐ Generalizing from specific to the abstract ☐ Synthesizing information across disciplines • **Creative Thinking** ☑ Practicing fluency, flexibility, originality, elaboration in thought ☐ Using a creative problem-solving heuristic	**USED GRAPHIC ORGANIZERS/TEACHING MODELS** ☐ Need to Know Board ☐ Venn Diagram ☐ T-Chart ☐ Literature Web ☐ Vocabulary Web ☐ Paul's Reasoning Model ☑ Reasoning About a Situation or Event ☐ Research Model ☐ Other_____ ☐ Other_____

Lesson Implementation (Activities/Strategies/Questions)

Note: Please include specific questions you would pose to students in *each* lesson.

1. Review of last week. Last week students built the "Smart Spinner" and used the motion sensor to control when the motor turned off. Robots need sensors to get INPUT, which is one of our four system components.
   a. "What types of sensors do robots use?" (Ask students to brainstorm to come up with answers and record on board.)

b. Show video clip of Neo robot that identifies many sensors. "Did you see any that we should add to our list?" Add as appropriate.

c. "Why do robots need sensors?" (Ask students to brainstorm with their partner and then collect answers on board) Discuss the answers students give. Robots need sensors to get input.

d. "How do robots know what to do?" "Can robots think?" Robots are programmed by people to respond to input from sensors in a certain way. In our class, we use the WeDo language to program our robots. Programs instruct the robot how to respond to certain inputs.

e. Review program from last week:

"What inputs are used in this program" - Input is gathered from the motion sensor. Show students how to translate this program into a set of instructions.

i. START

ii. Turn motor this way

iii. Play sound 15

iv. Wait for signal from motion sensor (Decision: If input from motion sensor, then go to next step.)

v. Turn motor off

vi. Display zero on screen

vii. Wait for 10 tenths of one second

viii. Add one to number on display

ix. Loop back to step vii (until you stop the program)

f. Show students example of flow chart, a tool that programmers use to plan their programs.

g. "How is a robot's program like your brain?, How is the robot's program different from your brain?" Have students make a two column (Similarities & Differences) list and brainstorm some ideas.

h. (optional if time permits) Show video clip of soccer playing robots. "Are the robot soccer players good soccer players?" "What makes them better or worse than human soccer players?"

2. Today we are going to make an alligator that will open and close its mouth to chew its food. You will create a program to control the alligator's mouth in different ways. Try to control the alligator's mouth with the keyboard and then with a sensor.

a. Do you remember how to use pulleys and belts to reduce speed? (We did this in the dancing birds model). Discuss. "How much slower is the large pulley than the small pulley? (About three times as slow)

3. Have students start WeDo program. Open instructions for "Hungry Alligator". Students build at their own pace, advancing through the instructions on screen.

4. Alligator Program 1

a.

b. Let's look at the program for the alligator. The first button is different than what we used before. You have to click on the upward arrow at the bottom frame to expand the programming window. This button means start on key. You can change the start on key to be any key you want by moving the mouse over it and typing the new letter.

c. What instructions are we giving the alligator?

i. Start when the A key is pressed

ii. Turn the motor that way (closes the jaw)

iii. Make sound 17 (crunching sound)

iv. Turn the motor this way (opposite way of step ii, opens the jaw)

v. Run the motor for 7 tenths of a second (to open the jaw)

5. Alligator Program 2

a.

b. What instructions are we giving the alligator now?

i. Start

ii. If *get input from motion sensor* then *turn motor that way* (Wait until this happens)

iii. Play sound 17

iv. Turn motor this way for seven tenths of a second

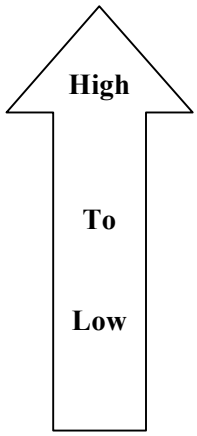
v. Go back to step ii

6. "Can you modify the program to make the alligator chew its food twice instead of once? Can you modify the program to make the alligator make a sound when he is done eating? " Give students time to try one of these challenges. Observe.

7. "Which program that you created today, did you like the best and why do you think it is better?" Discuss.

8. "How can we program a robot alligator to be more like a real alligator?" What do you need to know? Why are sensors needed in robots? Why are programs needed? Can a robot "think"? (We need to know what behaviors the alligator has in nature and we write programs to mimic or simulate these behaviors. We need to be able to program the robot to sense something that tells it when to behave a certain way.)

9. James McLurkin, a robot scientist (or roboticist) has said "It is difficult to articulate to people who aren't in the field how stupid robots are". Why do you think he said this? What does he mean?



Have I presented/asked questions based on Revised Bloom's Taxonomy?

- ☐ (C) Creating – being able to generate new products, points of views, and/or ideas (action verbs: design, construct, plan, produce, invent, devise, make)
- ☐ (E) Evaluating – being able to make judgment about something (action verbs: hypothesize, critique, experiment, judge, test, interpret)
- ☐ (An) Analyzing – being able to break information into components/parts and distinguish between the parts (action verbs: attribute, compare, contrast, integrate, differentiate, examine, distinguish)
- ☐ (Ap) Applying – being able to use the information in a different context (action verbs: complete, illustrate, practice, demonstrate, use)
- ☐ (U) Understanding – being able to explain an idea or concept (action verbs: describe, explain, restate, tell, identify, summarize, paraphrase)
- ☐ (R) Remembering – being able to recall information (action verbs: recall, repeat, name, list, record, find)

Assessments *(These can be "look fors" and/or formal assessments)*

"Look Fors" – students understand that a robot cannot make decisions unless a human writes a program that tells it how to decide. Students gain proficiency in assembling components and in writing and modifying programs.

Entry in Learning Log

Extensions *(These are optional activities that a child may want to do as an extension of the lesson).*

1. Create a habitat for your alligator. Take a picture of your alligator in its habitat for the class wiki.
2. Find out where real alligators live. What are their habitats like? Draw a picture or write a short story about it.
3. Find out about people who design robots. Read the story about James McLurkin on the class wiki. Do you think you might like to do his job? Why or why not? Or http://www.pbs.org/wgbh/nova/secretlife/scientists/colin-angle/
4. Learn about how robot designers try to make their robot's programs more "brain-like". Watch this example of soccer playing robots (on the class wiki). Are the robots better players than most children? Why or why not?