Chapter 19

Roberto Lituma: ETOYS Computer Program

I was born in Ecuador, and I came to the United States in 1982. I am married and have 5 children. At the beginning of my career I worked as a teacher in technical schools in the field of mechanics as well as working as an industrial mechanic. My specialty was welding, and machine operating. Later, I was curious to experience a new field and I moved to Silicon Valley, California to work as a testing engineer. In 1993 I came back to teaching and I have been working as an elementary teacher since then. I like to teach mathematics, and my hobby is playing soccer, which I practice with the students at the school where I am currently working. I have a Bachelors of Electronic Engineering from DeVry University, and I have two Master Degrees from Chicago State University in Bilingual Education and in Mathematics.

CREATE, and ANIMATE OBJECTS IN ETOYS Computer Program.

Grade Level: Grade 5-8

Content Area Topic:
This lesson is on Computer Programming: the students will animate drawing objects with the use of scripts. The animated objects will perform well-defined actions, and apply mathematics: using Measurements, Geometry, and Algebra.

Content Area Standard(s):
Common Core Technology Standards
- Reading RI.5-7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- Writing standards W. 5.7**:** Conduct short research projects that use several sources to build knowledge through investigation of direct aspects of a topic.
- Language L.5.6**:** Acquire and use accurately grade-appropriate general basic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationship.
- CCSS-Math Standards (Domain: Expressions and Equations)
- 5. OA.2: Write simple expressions that record calculations with numbers and interpret numeral expressions without evaluating them.
- 5. NF.5.a: Interpret multiplication as scaling (resizing) Compare the size of the product to the size of one factor on the basis of the sizes of the other factor, without performing the indicated multiplication.
- 6. EE.6: Use variable to represent numbers and write expressions when solving real-word or mathematical problems; understand that the variables can represent an unknown, or, depending on the purpose at hand, any number in a specified set.
- 6. G.4: Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures.

Learning Objective(s):
- Recognize scripts in a computer program.
- Solve multi-step problems based on real-life situations.
- Draw geometric shapes.
- Create algebraic expressions and apply to the motion of an object.
- Know and apply the property of integers, and generate motion.

Suggested Time Allotment: 60 min.

Sequence in Learning:
- Briefly review requisite and subsequent lesson(s)
- Discussion/Activities/Key Terms
- Planning and Preparation. - This Lesson is on Computer Programming. The Objectives of this lesson are for students to learn the role of the computer programs in the real world, and to promote the mathematical curiosity, persistence, precision and logical thinking. The students will apply their geometric concepts of figures like circles, squares, and different lines, as well as basic concepts of algebra using variables associated with time.

Procedures:
The class will use ETOYS: Which is a student friendly computer environment and object oriented prototype program. Our goal is to make a design: in this case a simple car with a few characteristics and attributes inspired in a similar project on one of the ETOYS activities. The main purpose of the exercise is to develop problem-solving skills. In the course of completing the activity the students will cover a number of cross-curriculum standards including computer design, drawing, and public speaking when they present their work.

Materials & Resources Needed:
- Desktop computers, Projector, Internet Connection, Elmo, Flags (3 colors), Quick ETOYS guides on: navigation, paintbrushes, halos, and supplies. Rubrics.
- Vocabulary: Navigator Bar, Paint tools, Halo Handles, Supplies, Object Catalog, Scrip tiles, Menus, commands, tests. This words will be used during the programming and will give directions and facilitate the accomplishment of the task.
- On the first Page of ETOYS program we find the Quick Guides: Which the students and teacher reviewed in previous sessions.
- In the Navigator Bar: are located the source of tools to move between projects, to publish and to paint. Here I am mentioning some of them:
- Help-Project Name-Previous Project- Next Project- Paint Tools- Supplies- Languages- Full Screen Toggle- Find Projects- Publish- Quit-Hide Navigator Bar.
- Paint Tools: brushes, color palette, bucket tool, straight line tool, ellipse tool, polygon tool, color picker, stamp tool.
- Halo Handles: make the handles show, viewer of script titles, size color copy, move and pick up, rotate handle, trash, arrow at center, center of rotation, menu tools, make a script title collapse, color property sheet.

- Supplies: text, all scripts, joystick control, sound recorder, Holder, players tool, add a new flap.
- Object Catalog: Slide bar, grab patch tool, lasso tool, digital image, maker button, polygon.
- Script Titles: forward by, turn by, bounce motion, X and Y titles, pen use, playfield trial, stamps, heading, scale factor, hide and show, world input, overlaps dot, sound category, width and length, , forward and turn, random numbers, tests categories, exact locations, wrap, two tests category.
- Menus: normal ticking, viewer Icon set, scriptor Icon set, button fires a script, grab me, revel me, watchers, bring to front, decimal places, playfield graph paper, drop shadow, painting, grid and snap to grid.
- Books: Top border Icons, expanded controls, working with layers, Navigation titles. The painted object before it is named is a *sketch*. It is recommended to name sketches after painting.

Lesson Activities & Sequence:
- The students will be divided in groups of 3 and I considered mixing students with high and low scores, the groups can work together, or make their plans, and discuss their ideas and work individually on their own computer. Groups can present one project or each member presents their project.

- We will present the task and review the steps, and program functionality (Review: Painting Tools, and Halo functions of the program with all the details.
- The teacher will develop one example of a geometric figure and make it perform movements, to learn about angles, negative numbers and other characteristics that the motion of the object will present to engage the students in the task.
- Then, the students and the teacher will do an activity together. Using the paintbrush will draw an object, and with the "halo commands and scripts" will do the animated simulation similar to the projected task.
- The student will make a drawing of a an object (car) make the car go forward by 100 units, turn 90 degrees left, turn 90 degrees right, adjust the variables x and y, and use the variables randomly. The teacher will assist the students or groups who have questions or problems to solve. Also, I will go around the room, to make sure the students are working with confidence and getting their goals.
- To complement the activity the teacher will call some students and ask them to program to each other taken places of programmer and object. The next group will write a program to draw a geometric figure.
- The students, who finish the task first, will take the car to the road

and drive them on the right, left, or center of their designed road.
- The students will share their project to their classmates, using the projector, and visiting different groups.

Adaptations and Modifications:
Students with IEP's or special needs will have partners to work with, and one to one assistance for ELL. The students with IEP's will have a special guide to follow and their tasks will be accommodated. (See student's accommodations)

ETOYS PROJECT.
Please get familiar with the painting tools, halo Command, panes, tiles, actions and properties, read the information, and follow the directions
Open ETOYS and click the question mark in the top left corner of the Etoys Navigator Bar to open the set of Quick Guides. Here is where you will find a range of topics of interest.
Halo Handles: The colored Icons surrounded an object allow for different manipulation and change to that object. Every object has a set of halo handles. Right click on anything to revel its icons. Each icon is supplied with balloon describing its function.
Script: Objects can be sent messages and instruction by combining titles and running them in a scriptor. Please name the scripts as soon as you create them.

Scripting: The Viewer shows categories and properties and instructions for the object represented by tiles.
Click the Yellow exclamation point to run a particular instruction.
Drag a title and drop it on the screen to form a script.
There are many categories of title, click on the category name, like basic, to open a menu of categories.
Now please assemble scrip tiles for commands such as: Forward, Turn, and complete your task. ANIMATE AN OBJECT (your choice) you may select from the supply Box.
For students who finished the first assignment. ANIMATE AN OBJECT. (CAR)
For the drawings please use the suggested colors to be able to assign tasks, and make sure to create every object in a new page.
Draw a car (red body, black tires and with a sky blue spot on the front)
Draw a road (Brown)
Draw a finish line (green)
Right click on the object>click on the BLUE EYE and open a viewer >select **sketch** and change the name to car.
Noticed that the viewer is broken up into different PANES – Each pane shows category of action tiles, and properties. You may see SEARCH, BASIC, or others.

Every Pane is the same, in that it can hold any of the categories that you set it to.
To change the category of tiles appearing in a pane, use the pull down menu at the top of the pane.

CREATE A SCRIPT TO MAKE THE CAR MOVE FORFARD.
DRIVE Command
Car- script 1- (Change script 1 -to drive)
Car forward by 5
TEST: car's … color sees …color
YES car turn by 5
NO car turn by -5
RESET Command
Car-empty script - (Change –empty script - to reset)
Car's x from white arrow #
Car's y from white arrow #
Car's heading from white arrow #
FINISH LINE Command
Car-empty script - (Change empty script - to finish line)
TEST: car's … color sees …color
YES car stop script- drive
NO

Proficiency:
When the students accomplished their task the entire activity will be on the computer display, and the satisfaction of their creation will be reflected with a big smile or WOW exclamation.
Finally, as an evaluation or assessment the students will write on a paper their interpretation of the script that performs the task on their object, and final projects will be presented to the entire class or shared using the Google drive. (Evaluation questions and a rubric is attached)

REVIEW QUESTIONS
Briefly answer the questions below.
• Can you tell in your words what a "halo" of an object is?
• How do you open a "viewer" for an object?
• Name some properties of an Object.
• How can you make an object move forward?
• How can you make an object move backwards?
• How can you make an object change the direction of the "turns"

Assessment Rubric:

CATEGORY	4	3	2	1
Content	Excellent evidence of background work and critical thinking. All facts and major concepts and Ideas accurately stated.	Includes essential knowledge about the topic. Most facts and major concepts and Ideas accurately stated.	Includes essential information about the topic. Some facts and major concepts and Ideas accurately stated.	Content is minimal Few facts and major concepts and Ideas accurately stated.
Organization	Content is very well organized and logically sequenced.	Content is mostly organized and logically sequenced	Content lacks some organization and logically sequenced	There was no clear or logical organizational structure, just lots of facts.
Originality	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking.	Uses other people's ideas, but does not give them credit.
Requirements	All requirements are met and exceeded. All group members were participating and contributing to the activity	All requirements are met. Most of the group members are on task and participating.	One requirement was not completely met. The group members were easily distracted.	More than one requirement was not completely met. The group was off task the majority of the time.

Total Points____/16

The homework assignment would be to plan a challenging activity like to write scrip to drive their car (drawing- object) from a parking lot to the garage.

Feedback

Teachers As Learners:
The teacher presented the project with a physical role-play calling a volunteer to program giving and executing the commands. The teacher models the activity, pointing out that tutorials were available for anyone who needed. The teacher encourages the students to try and play with the program before the activity; confidence and enthusiasm were transmitted to the class. The students had a choice of designing any object besides the car that was use in modeling activity.

Elements of Pretty Good Practice:
The teacher used the student choice for designing the object. Modeling the activity, also using the strategy I do it, we do it, you do it. The gradually release of responsibilities, ask students to answer their own questions by throwing students questions out to the class for response, and individual check-ins during the activity.

Modifications and Adaptations:
The students can create an animation that demonstrates a content area concept. We recommend the students to write their own guide and challenge another student to solve the problem.

Questions Arisen:
What is the best way to accommodate learners that want/need to get started right away as well as learners that want/need the teacher to model? What might this activity look like with older students? Younger students?
The Colleagues suggested to have students create an animation that demonstrates a content area concept, and to use a program like Tynker to start teaching the logic.

Bibliography:
- Squeakland (www.squekland.org)
- MSTE) (Math, Science, Technology Ed. At UIUC) (mste.illionois.edu)
- *Related Resources/Ideas:*
- The Web Site (cs4hs.cs.illnois.edu)