Title of Project: Coder Kids
Subject(s): Technology/Computer Lab
Grade Level(s): 1st
Abstract:

      My first grade students will be participating in a six-week project leading up to Computer Science Education Week, which is December 8-14, 2014. Students will assume the role of "coders" and be introduced to computational thinking. Students will also be encouraged to assume the role of teacher and help peers solve some of the complex coding and logic problems within the unit. Through a variety of online and offline activities students will come to understand and appreciate the critical thinking behind coding a game or computer program. Students will be tasked with writing and illustrating frequent reflections about various coding topics. Students will also participate in various online coding simulations and partner up to play a fun "unplugged" computational thinking exercise.

Learner Description/Context:

      This engaged learning project will be implemented with the first grade population of Buford Elementary School. There are roughly 325 first grade students who will be participating in this project. Buford Elementary has a diverse population. 46% of students are Caucasian, 37% are Hispanic, and 12% are African-American. 51% of our student population is eligible for free-and-reduced-lunch, which qualifies Buford Elementary as a Title 1 School. Average class size ranges from 18-23 students per class. The learning experience will take place in a computer lab setting with each student having access to his or her own desktop computer. The duration of the unit will occur over the course of six weeks in the fall of 2014. The activities listed will be readily available to any teacher who would like to replicate it. All sites, games, and activities are free and require no purchase. The unit will be comprised of a mixture of student-directed and teacher-directed activities. The primary goal of this project is to introduce coding and computational thinking in an attempt to strengthen the students' abilities in reasoning, strategy, and problem solving skills.

Time Frame: The project will occur over six weeks in November and December of 2014. Students will have six fifty-five minute sessions of instruction. Teachers utilizing this project should consider using six to ten hours of instructional time to complete the unit.

Standards Assessed:

GA DOE Career Cluster Guidance / National Career Development Association Standards
Students learn about different kinds of work
Students learn about goal setting and decision-making
Students learn what it means to be a good worker

Kindergarten (These standards are introduced in Kindergarten but continued in First.):
CCGPS.K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

MCCK.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.
a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.
b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.
c. Understand that each successive number name refers to a quantity that is one larger.

CCSS.MATH.CONTENT.K.CC.A.2 – Kindergarten (Counting & Cardinality)
Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

CCSS.MATH.CONTENT.K.CC.C.6 - Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.
CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.
CCSS.MATH.PRACTICE.MP6 Attend to precision.
CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.

W.CCR.6 Students use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
Standard: W.2.6 - With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.

ISTE-NETS-S
1. Creativity and Innovation - Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
a. Apply existing knowledge to generate new ideas, products, or processes
b. Create original works as a means of personal or group expression
c. Use models and simulations

4. Critical Thinking, Problem Solving, and Decision Making -
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
a. Identify and define authentic problems and significant questions for investigation
b. Plan and manage activities to develop a solution or complete a project

6. Technology Operations and Concepts - Students demonstrate a sound understanding of technology concepts, systems, and operations.
a. Understand and use technology systems
b. Select and use applications effectively and productively
c. Troubleshoot systems and applications
d. Transfer current knowledge to learning of new technologies

Learner Objectives:
 Throughout the course of this project students will be expected to access higher-order thinking skills and reach higher levels of Bloom's Taxonomy to complete many of the tasks. Through the use of coding simulation activities, students will reinforce key mathematical concepts such as: positional words, ordinal words, sequence dependence, count sequences, and functions. Of particular importance is the embedded use of functions within the _LightBot_ and _Angry Birds_ coding simulation activities. Students will explore repeated functions, understand the value within a function set, and sequence dependence. This will undoubtedly achieve higher LoTi levels and also higher levels of critical thinking and problem solving. Through repeated reflective writing activities, students will also come to understand the authenticity, meaningfulness, and multi-cultural importance of coding. Students will also participate in an exploratory career oriented learning experience as mandated by House Bill 713 and the Georgia Department of Education.

The "hook" or Introduction:
 In order to immediately hook the students; the introduction to the project should begin with a discussion about _Angry Birds_. The teacher will act as facilitator to open and sustain the discussion. The dialogue will need to evolve into how games are made, what code is, and why it is important to have a basic understanding of code. The introductory video will be the _Code.org_ video titled, _"What most schools don't teach"_. The video is approximately six minutes and short enough to not lose their attention. After, initial viewing of the introductory video, students will be prompted to write a two to three sentence reflection about the video.
Process:
 This project will take place over the course of a six-week period consisting of six fifty-five minute sessions. Teachers using this project should plan for between six to ten hours of instructional time. The project has a supplemental website to support both students and other teachers who would like to teach this unit. The link for the project is: http://coderkids.weebly.com/. Students will be allowed to work at their own pace on each of the steps with the exception of the "My Robotic Friends" activity. This activity will occur in session four or five depending on the pace of the students. Listed below are descriptions of each step of the Coder Kids unit website.

Coder Kids Step 1 Page – After the initial "hook" discussion, students will visit the Coder Kids website at the aforementioned link. Students will begin by viewing the _"What Most Schools Don't Teach"_ video from the _Code.org_ website. Immediately upon viewing the video, students will have to do a reflective writing assignment and write a two to three sentence paragraph about the video they just watched. The teacher will act as facilitator and prompt students to answer the discussion question, "Can you tell me why coding is so important?" This question is worded to meet a DOK rating of three. The intent is to elicit a response that will force students to use critical and higher levels of

thinking. Student responses will be typed into the Google Form box just below the streaming media clip. The student writing pieces will be sent to my Google Drive immediately after completion. Once finished with the reflective writing paragraph, students will move on to the next page. Student writing will be assessed with a grade appropriate rubric.

Coder Kids Step 2 Page – Students will begin by viewing the *"Code Stars"* video from the *Code.org* website. The teacher will act as facilitator and stimulate a brief classroom discussion following the video. Immediately upon viewing the video and classroom discussion, students will have to do a reflective writing assignment and write a two to three sentence paragraph about the video they just watched. Students will be prompted to answer the question, "What kind of jobs use coding and computers?" This question is worded to meet a DOK rating of one. This question is intended to prompt the students to begin thinking about careers in preparation for the next segment of the unit. Student responses will be typed into the Google Form box just below the streaming media clip. The student writing pieces will be sent to my Google Drive immediately after completion. Student writing will be assessed with a grade appropriate rubric. Once finished with the reflective writing paragraph, students will move on to the next page.

Coder Kids Step 3 Page – Students will act as an explorer and visit Cisco's interactive site, *Career Capture*. This site will provide students with student-directed time to explore streaming media clips and work in a digital scrapbook/journal. The *Career Capture* website is structured to be a sandbox environment for students. This component of the unit helps sustain a high LoTi level in that the activity is multi-cultural, showcases women in successful technology careers, prompts students to explore career pathways using technology, and is culturally responsive due to the global snapshots within the site's streaming media clips. This step within the unit will likely take one to two sessions. Students will want to spend some time working on their *Adventure Scrapbook* within the *Career Capture* site. The *Career Capture* site will engage learners with its authenticity and meaningfulness as well as touch on culturally responsive topics.

Coder Kids Step 4 Page – After devoting some time to laying a proper foundation of understanding coding, coding's importance and careers with coding, students will be prompted to begin practicing coding. Students will visit two different versions of a coding simulation activity called *Lightbot*. Students are to start with *Lightbot* 1. Once students demonstrate proficiency in programming *Lightbot* 1, students will then be allowed to move onto *Lightbot* 2. This step within the unit will likely take one fifty-five minute session. This phase of the unit touches on some crucial math standards and concepts. Students will explore functions, value within a function set, sequence dependence, positional words, ordinal words, and count sequences. During this phase of the unit students will be expected to assume the role of teacher and help their peers solve some of the logistic problems posed by the *Lightbot* activities. Students will be encouraged to move throughout the computer lab to assist others in need. The teacher will act as a guide to help students navigate the *Lightbot* levels by modeling solutions and providing options to solve the coding tasks within *Lighbot*. Through the *Lightbot* activities, students will push the envelope of their logic and reasoning skills allowing them to access higher levels of critical thinking.

Coder Kids Step 5 Page - Students will begin by viewing the *"Hour of Code - Introduction"* video from the *Code.org* website. Immediately upon viewing the video, students will use the same coding principles applied in *Lightbot* to begin programming in the *Angry Birds* activity. This activity will give students insight into the coding skills and critical thinking needed to design video games. The *Angry Birds* activity is an authentic and meaningful look into some of the backend processes behind one of their favorite video games. Students will again be encouraged to freely move about the classroom and assume the role of teacher and help others by collaborating on solutions to the problems encountered within the levels. The role of the teacher is to act as a guide by modeling solutions and providing options to solve the coding problems within the *Angry Birds* activity. Time spent on this activity will vary upon teacher. Similarly this part of the unit touches on some critical math standards and concepts. Students will explore functions, value within a function set, sequence dependence, positional words, ordinal words, and count sequences.

Coder Kids Step 6 and 7 Page - Students will begin by viewing the "My Robotic Friends – Unplugged Activity" video from the Code.org website. Immediately upon viewing the video, students will be paired up into groups of two. Students will be given cups, paper, and markers to begin the activity. Teachers will act as a guide and demonstrate beforehand the steps needed to begin. Once students have a firm grasp on the rules of the game, students will be encouraged to work together as co-learners towards the completion of the game. Students will also be required to turn in their programming sheet along with a sentence description of what function their code performed before moving onto the final task.

Coder Kids Step 8 Page – The final culminating activity will be for students to write a two to three sentence paragraph and also make an illustration about a computer program that they would like to make or see get made. Students will

Adam Meador ITEC 7400

be using the free open source children's drawing and painting program, Tux Paint. A sense of audience will be established immediately with the students. Students who excel in their designs will have their computer program ideas showcased in the Student Gallery of the Coder Kids website. This will generate peer competition as well as bring authenticity to the unit by giving the students an audience of peers. Student work will be assessed with a grade appropriate rubric.

Product:

In steps one and two, students will be generating two to three sentence reflective writing pieces pertaining to streaming media clips. In step three of the unit, students will be working on an *Adventure Scrapbook* within the *Career Capture* website. This will provides students with more journaling and reflective writing components thus making the activities more meaningful and authentic. Multiple technologies are integrated into the project. Students will be submitting writing samples through Google Forms. Students will be viewing streaming media clips, accessing a Weebly page, listening to audio samples via Vocaroo and using drawing and painting software. Student work will be assessed with a grade appropriate rubric. Students will care about their performance on the final task because the Student Gallery will serve as a portfolio showcase and forum to share and view students who excelled in the activity.

Technology Use:

The most crucial technological component of this project is the Weebly page. Google Forms also plays a critical role in the collection of student writing. Vocaroo adds an assistive technology component to the flow of the lesson. Struggling readers or students with visibility issues can easily click on the Vocaroo buttons to listen to directions. The Weebly page is streamlined to be simplistic and easily navigated. Another critical component would be the interactive Flash elements. The *Lightbot*, *Angry Birds*, and *Career Capture* sites all have interactive Flash components to the site that make the learning engaging, fun, authentic and challenging. Tux Paint plays an important part in the unit as well. Tux Paint offers students an easy to manage solution for digital publishing with text and drawing and painting functions. These components bring the LoTi level to a 5.

References and Supporting Material:

Chilcott, L., Partovi, H., & Lieberman, J. (2013, February 26). "Code Stars" - Short Film [Video file]. Retrieved from http://www.youtube.com/watch?v=dU1xS07N-FA

Chilcott, L., Partovi, H., & Lieberman, J. (2013, February 26). Hour of Code - Introduction [Video file]. Retrieved from http://www.youtube.com/watch?v=bQilo5ecSX4

Chilcott, L., Partovi, H., & Lieberman, J. (2013, February 26). My Robotic Friends - unplugged activity [Video file]. Retrieved from http://www.youtube.com/watch?v=xaW3PAzHxCU

Chilcott, L., Partovi, H., & Lieberman, J. (2013, February 26). What Most Schools Don't Teach [Video file]. Retrieved from http://www.youtube.com/watch?v=nKIu9yen5nc

Cisco Systems, Inc. (2006). *Career Capture*. Retrieved July 10, 2014, from http://www.cisco.com/web/learning/netacad/careercapture/index_en.html

Engineers from Google, Microsoft, Facebook, and Twitter. (2013, February 26). *Code.org - The Maze #1*. Retrieved July 10, 2014, from http://learn.code.org/hoc/1

Kendrick, B. (2002). *Tux Paint*. Retrieved July 10, 2014, from http://www.tuxpaint.org/

Meador, A. J. (2014, July 9). *Coder Kids*. Retrieved July 10, 2014, from http://coderkids.weebly.com/

Thinkersmith. (2013, December 9). *Traveling Circuits 3 My Robotic Friends*. Retrieved July 10, 2014, from http://csedweek.org/files/CSEDrobotics.pdf

Yaroslavski, D. (n.d.). *Lightbot*. Retrieved July 10, 2014, from http://light-bot.com/hocflash.html