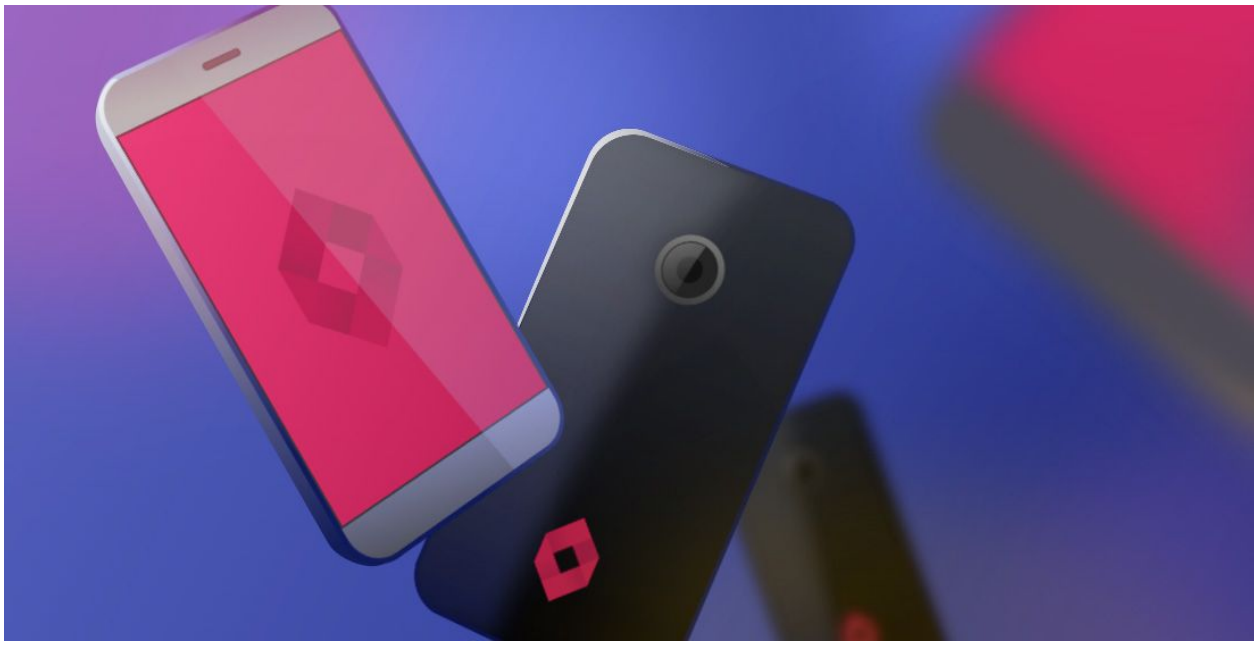
Project Plan:
A Design for Inquiry

Computer Coding and Technology



Description of the class:

This class is a grade 4 composed of 30 culturally and socially diverse learners. Some general characteristics of the classroom are that they are very bright and high energy however; they need a little push to maximize their potential. The students are very friendly, engaged and well-behaved throughout the class. They enjoy hands on activities and like working collaboratively. Most students in the class seem to have a middle-class socioeconomic status. There does not seem appear to be any behavioural issues in the classroom. However, there are children in the class that may have learning needs. One student designated as learning disabled, three students attend LST (formerly known as Learning Assistance), five students attend LST (formerly known as ESL), one student attends Write Stretch and thus tagged as gifted, and two student's former 'Stretch' students and who were also tagged as gifted.

Topic:

Applied Design, Skills, and Technologies

History of Technology, Simple Coding, Computer Coding, and Robot Coding

Rationale and Objective:

We designed our unit plan according to what the students chose, which was mainly related to computer coding and technology. We focused on the three main big ideas under Applied Design, Skills, and Technologies. These included designs grow out of natural curiosity, skills can be developed through play, and technologies are tools that extend human capabilities. The lessons we planned fosters students' natural curiosity, inventiveness, and desire to create and work in practical ways. The power of learning comes by doing and providing with challenging yet fun activities. Students work with the big ideas and discover skills and concepts from areas such as Information Technology and Technology Education. Students were given the opportunity to work collaboratively to problem find and solve by exploring tools and equipment, designing, and coding by the different activities we planned in our lessons. Moreover, engaging students' with art education stimulates imagination, creativity, and innovation by connecting with history and community. Furthermore, a combination of grade-level content from other areas of learning in cross-curricular activities was used to develop foundational mindsets and skills in design thinking and making such as arts education, social studies, and mathematics.

Assessment:

The evidence that shows the students met the learning objective is the Know-Wonder-Learn worksheet. Students filled out the “LEARN” portion on the worksheet about what they have experienced and discovered over the course of the four lessons. The crossword also tested the knowledge of the timeline that was presented in the first lesson about the history of technology. We also included some questions from the coding game they played. It helped students to think creatively in a more strategic fashion rather than a test or quiz. These two worksheets demonstrated students learning. The one star and one wish were for our personal growth as teachers to know what the students enjoyed and what they did not. Assessment was done by evaluating the success of their design and code and how they are able to demonstrate it. Lastly, their ability to work effectively and both individually and collaboratively in a group.

Resources:

https://curriculum.gov.bc.ca/curriculum

https://studio.code.org/s/frozen/stage/1/puzzle/1

https://studio.code.org/s/mc/stage/1/puzzle/1

This resource introduces computer science basics in a format that is fun and accessible young individuals. It is available at https://studio.code.org/. Educators can make an account and see each student's progress in a certain game. Students need to read the instructions to code their character and if they do not succeed, they will not be able to get to the next level.

http://www.sphero.com/sphero

This resource is an app-enabled robotic ball called sphero. It can be connected to a smartphone or a tablet via Bluetooth. Sphero has a quick start guide to get it rolling through the app store, google play, or windows store. It is available at https://store.sphero.com/collections/sphero. Sphero safety instructions and information guide should be read before operating it.

Lesson Plans:

Lesson One

Topic: History of technology

Big Ideas:

- Designs can be improved with prototyping and testing
- Artists experiment in a variety of ways to discover new possibilities

Core Competencies:

- Using trial and error to make changes in their code
- Solving problems, incorporating self and others ideas to make the code better
- Designing robotics coding by collaborating with other students

Content:

- What we use computers for and how they are important in our society today
- Strategies they will learn management, personalization, contribution, creation, sharing, communication
- Learning from mistakes and problem solving
- Basic robot behaviours using movement, responses, controls

Lesson layout:

Introduction – discussion on why we are learning about technology and how prevalent it is in our society today. What do we use computers/technology for? (examples such as hospitals, factories, machines, education, entertainment...etc.).

Know-Wonder-Learn – Get the students thinking about what they already know about computers, technology, coding, robots, and what they wonder.

Timeline – Pictures of different technology taped under student's desks, students collaborate with neighbours and decide when the item was invented and where on the timeline their item were invented such as what year.

Robot masks – students solve the puzzle to find their robot name and colour their robot masks

Conclusion – discussion about the timeline, the technology boom, and why computers are important in our society.

Enactivism: Students were engaged in the lesson by collaborating with their peers about the timeline pictures and creating the timeline themselves. Enactive learning is doing, having the students moving and working as a team to complete the task demonstrated this.

One Star: Students really enjoyed looking under their chairs to see if they had a photo, this was a great way to get the students excited about the timeline.

One Wish: There was not enough time to full discuss the timeline, to make this lesson more meaningful we could have saved the robot masks for next time and spent more time on the timeline.

Lesson Two

Topic: Simple Coding

Big Idea:

- Skills are being developed through play

Core Competencies:

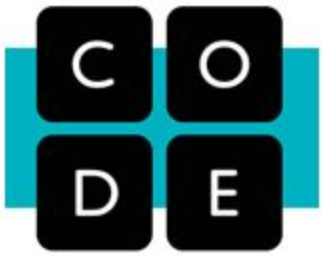
- Using trial and error to make changes in their code
- Solving problems, incorporating self and others ideas to make the code better
- Designing robotics coding by collaborating with other students

Content:

- What we use computers for and how they are important in our society today
- Strategies they will learn management, personalization, contribution, creation, sharing, communication
- Learning from mistakes and problem solving
- Basic robot behaviours using movement, responses, controls

Lesson layout:

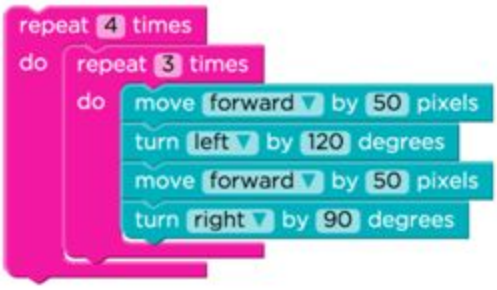
Introduction: Review from the previous lesson why are computers important in society today? Discuss as a group and write ideas on board



Coding robots – in groups of 3 to 4 students manually write a simple code on a piece of paper. Students then take turn being the robot and follow the code. Students had to understand how to break down a movement to explain it to a robot. Reminding students that robots only do what they are programmed to do.

Conclusion – What technologies other than robots are coded?

Enactivism: Students worked in teams to create a code then instead of putting that code into a computer they were active engaged by actually doing the code themselves. Having the students act out the codes they created enhanced the experiential learning aspect.



One Star: Students enjoyed being robots, having them act it out was a key part of this lesson as it solidified the understanding of the code they created.

One Wish: Having a better description and more examples of the coding the students could use would have been beneficial to creating more complex codes and longer sequences.

Lesson Three

Topic: Computer Coding

Big Ideas:

- Skills are being developed through play
- Designs can be improved with prototyping and testing

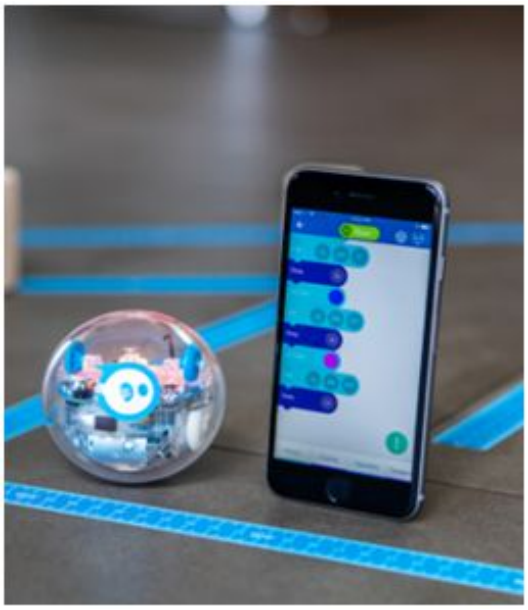
Core Competencies:

- Using trial and error to make changes in their code
- Computer science fundamentals skills are developed through practice, effort, action

Content:

- Learning from mistakes, problem solving through online, self-guided, and self-paced tutorial
- Basic skills using movement, responses, control, programming

Lesson layout:



Introduction – Recap of the simple coding from the previous week. Introduction and explanation of computer coding game

MacBooks – Students got into pairs and each pair got a laptop. Students got to choose the Star Wars game or the Frozen game, as a team they had to work their way through the levels of the game using coding. Once they were finished all levels they could move onto any game they wanted. The coding game was from https://code.org. As students were playing, we explained to them what this type of coding was used for.

Conclusion – If this is how hard it was to code just one character, how hard would it be to code for an entire video game full of characters?

Enactivism: Students working in pairs gave them a chance to collaborate and use each others knowledge to get through each level; learning through play and teamwork.

One Star: Having students working in partners was a great method so students could collaborate ideas about how to pass each level.

One Wish: Having more time with the students would have been beneficial as all of the students wanted to continue creating codes and advancing levels.

Lesson Four

Topic: Robot coding

Big Ideas:

- Skills are being developed through play
- Technologies are tools that extend human capabilities.

Core Competencies:

- Skills are developed through practice, effort, action
- Using trial and error to make changes in their code
- Explore the use of simple, available tools and technologies to extend their capabilities

Content:

- Learning from mistakes, problem solving
- Basic skills using movement, responses, control, programming
- The importance of technology and when certain things were invented

Lesson layout:

Sphero – Students are introduced to Sphero the real life robot. Instructions are given about how to use it. Students were pulled into the hallway in a group of 3-4 at a time to each get a turn to engage and code Sphero. Students were shown different ways to code Sphero such as various apps that can be used.

Know-Wonder-Learn – Students get back their KWL sheets to fill out the “LEARN” portion about what they have learnt over the course of the four lessons as an assessment.

Crossword – Students are given a crossword with trivia about technology. Students were to complete this while waiting for their turn with Sphero. This is also as an assessment of the important facts and information they learned throughout the lessons.

Conclusion – Students asked to write down “One Star, One Wish”. One thing they really liked about our unit and one thing they wished we could have done or that we could have done better. Learning from the students' feedback is very beneficial.

Enactivism: Students were actively engaged and very excited about coding a real robot! While one student was coding the other three were making obstacle courses with their legs for the driver to get Sphero to go through, keeping all students engaged and enjoying the experience.

One Star: This was a big hit, students really enjoyed Sphero and they all wanted to keep it. This was a great way to end the unit and get the students excited!

One Wish: With the amount of students and the short time we had it was difficult to give all students a sufficient amount of time to program and play with Sphero.