CODE/MOE/UOIT Makerspaces Project

Lesson Planning Template

BIG IDEAS:

-Coding is a tool by which one can communicate a stated function.
-Coding is a specific language by which one can communicate a stated function.
-Technological problem solving skills (i.e., initiating, planning, performing, recording, analysing, recording, communicating) can be utilized to solve a technological problem.
-Technological problem solving involves designing, building, and testing (on the basis of pre-determined criteria) a device or an object.
-Experimentation involves conducting "fair tests" to determine whether changing one factor in the experimental set-up affects the results, and, if so, in what ways.

Curriculum Expectations:

- Science and Technology:

-use technological problem-solving skills (see page 16) to design, build, and test a device
-use a variety of forms (i.e, coding language) to communicate for a variety of purposes

- Language

-demonstrate an understanding of appropriate listening behaviour by adapting active listening strategies to suit a range of situations, including work in groups (e.g., ask questions to clarify understanding before responding; affirm and build on the ideas of others; summarize and respond constructively to ideas expressed by others; use brief vocal prompts to signal agreement or interest during conversations**)**

Learning Goals: "We are learning to…"	**Success Criteria:** "We will be successful when…"
• Use a coding app to code a robot of choice and make it perform a stated function • Work collaboratively with a partner by utilizing appropriate listening behaviours	• The coding utilized results in the robot performs the stated function • The end result is a collaboration between both partners

Lesson Overview:
Prior to engaging in this lesson, students should have some experience with coding. It is useful if students have worked through an online coding module. The website Code.org has some useful modules

Adapted from eworkshop.on.ca

that students can access. Module 2 provides a nice series of lessons that teach students the basics of coding. Teachers can create their own class and monitor students' progress.

In this lesson, students will select a coding application and use it to program a robot (i.e, EV3 creation, Dash and Dot, or Sphero) to perform a stated function. This lesson plan will likely span a minimum of 5-40 minute periods once students

Materials and Technology:

- Mini IPADS
- Coding Applications (i.e, **Dash and Dot**: Wonder, Blockly, Path, Go, Xylo**; Sphero**: Tickle and SPRK; Lego Mindstorm EV3 Programming Education Edition
- Dash and Dot Robot
- Lego Mindstorm EV3 Kit – Education Edition
- Sphero Robot

Student Accommodations/Modifications:	**Lesson will be differentiated by:**
- Extra Time - Material Read to students – as needed - Peer Buddy – pair students confident and comfortable with technology with students who are less confident and comfortable	**√Process, specifically:** ***Product, specifically: students can decide on the depth/breadth of their project**

MINDS ON: Getting Started

During this phase, the teacher may:	During this phase, students may:
• activate students' prior knowledge; • engage students by posing thought-provoking questions; • gather diagnostic and/or formative assessment data through observation and questioning; • discuss and clarify the task(s).	• participate in discussions; • propose strategies; • question the teacher and their classmates; • make connections to and reflect on prior learning.

Describe how you will introduce the learning activity to your students. What key questions will you ask? How will you gather diagnostic or formative data about the students' current levels of understanding? How will students be grouped? How will materials be distributed?

Put students in partners and post the following statement .

1) Think-Pair-Share:

Here is a quote from a very successful man from the company "Apple Computers":

"Everybody in this country should learn to program a computer, because it teaches you how to think."

******Gather anecdotal diagnostic assessment of students' knowledge and comfort with programming based on students' responses.

2) Whole Group Diagnostic Assessment: Complete a KWL Chart to gather information about students' knowledge of computer programming.

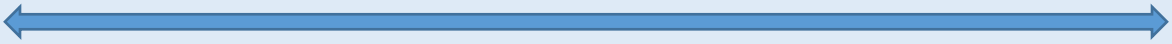
What Do You Know About Computer Programming?	What do you want to learn about computer programming?	What I learned about Computer Programming.

3) Individual Diagnostic Assessment:

Post the following continuum on the board and give each student a 'post-it' note. Have each student put his/her name on the 'post it' note. Have students place the post-it note on the continuum on the blackboard. Use the information to pair students for projects during 'Action' portion of the lesson.

I am just beginning my Journey with computer Programming

I have experience with computer programming. I feel confident and Comfortable.



1) Watch the following utube clip and be prepared to answer this question: If you could design a robot, what would you make it do?

https://www.youtube.com/watch?v=6feEE716UEk

Show students the Sphero, Dash and Dot, and the EV3 kit and share with students that they are going to choose a programming application and a robot and program the robot to perform a stated action (e.g, move around an object, move along a path, play the xylophone, push an object along the floor, etc,)

ACTION: Working on it

During this phase, the teacher may: • ask probing questions; • clarify misconceptions, as needed, by redirecting students through questioning; • answer students' questions (but avoid providing a solution to the problem);	During this phase, students may: • represent their thinking (using numbers, pictures, words, manipulatives, actions, etc.); • participate actively in whole group, small group, or independent settings; • explain their thinking to the teacher and

• observe and assess; • encourage students to represent their thinking concretely and/or pictorially; • encourage students to clarify ideas and to pose questions to other students.	their classmates; • explore and develop strategies and concepts.

Describe the task(s) in which your students will be engaged. What misconceptions or difficulties do you think they might experience? How will they demonstrate their understanding of the concept? How will you gather your assessment data (e.g., checklist, anecdotal records)? What extension activities will you provide?

-Provide students with a 'daily journal'. Students must record the answers to the following prompts daily:

- Today I was successful with…….
- One question I have is…..
- In order to proceed with my project I think I will need to……

**Collect the journals daily and touch base with students as needed.

- Students working with the EV3 robots may experience difficulty during the construction phase of the project as they need to ensure that the EV3 'brick' is incorporated into the lego creation without jeopardizing the movement of the robot
- In order to make the best use of time, review journal entries prior to the next scheduled lesson to solve problems encountered.

  Share with students that they are going to independently use the school computers or iPads to preview the following sites. At the conclusion of the viewing, students will record in their journal a 'project plan' statement by identifying:

  The robot I choose to work with is (circle one) : Dash and Dot EV3 Sphero
  The function I would like to program my robot to do is: _____

  **Use the project plan statements and the information from the 'continuum' of comfort obtained in the Minds-On section of the lesson, pair students in working groups. g

- **Are you interested in Working with Dash and Dot?**

There are many different 'apps' that you can use with Dash and Dot. It is up to you to figure out which ones you will need based on the project you have in mind. Here are a few to get you started:
Wonder, Blockly, Path, Go, Xylo

Here a few ideas to get you thinking!

Interested in making some music?

https://www.youtube.com/watch?v=wwWcZuoRt28&list=PLXSgvv3NnVuSYP9aZJOWPnkbVkxIAuoTX&in

dex=6

Are you a bit of a 'prankster'?

https://www.youtube.com/watch?v=K5QijCGLfeA&list=PLXSgvv3NnVuSYP9aZJOWPnkbVkxIAuoTX&index=10

Are you interested in robot battles?

https://www.youtube.com/watch?v=d6YDoViHE9U&index=18&list=PLXSgvv3NnVuSYP9aZJOWPnkbVkxIAuoTX

- **Are you interested in a project with SPHERO?**

  Two useful apps to use with SPHERO are: Tickle and SPRK

Some of the creative things you can do with Sphero and the programming app 'SPRK'.
http://www.sphero.com/sprk-plus

Do you like to play games?

https://www.youtube.com/watch?v=fYX-8Xp5YAQ

https://www.youtube.com/watch?v=OE406vVtQQo

Want a SPHERO challenge?

https://www.youtube.com/watch?v=JCPIRoMfTU4

Maybe you want to create something new with SPHERO?

https://www.youtube.com/watch?v=BmPBBvjm8Gw

- **Is LEGO Mindstorm more up your alley?**

What 'good' can you create?

https://www.youtube.com/watch?v=ovKzS_xnF0Q

Perhaps you want to create something new?

https://www.youtube.com/watch?v=sFUJuUDISJ4

https://www.youtube.com/watch?v=2cHZeZSOMMQ

https://www.youtube.com/watch?v=0DnyWSnfNi0

CONSOLIDATION: Reflecting and Connecting

During this phase, the teacher may:	During this phase, students may:
• bring students back together to share and analyse strategies; • encourage students to explain a variety of learning strategies; • ask students to defend their procedures and justify their answers; • clarify misunderstandings; • relate strategies and solutions to similar types of problems in order to help students generalize concepts; • summarize the discussion and emphasize key points or concepts.	• share their findings; • use a variety of concrete, pictorial, and numerical representations to demonstrate their understandings; • justify and explain their thinking; • reflect on their learning.

How will you select the individual students or groups of students who are to share their work with the class (i.e., to demonstrate a variety of strategies, to show different types of representations, to illustrate a key concept)? What key questions will you ask during the debriefing?

Complete the 'L' portion of the KWL chart created during the 'Minds-On' Portion of this lesson.

What Do You Know About Computer Programming?	**What do you want to learn about computer programming?**	**What I learned about Computer Programming.**

Sharing – Classroom 'Maker Fair'

-students will have the opportunity to showcase their programming during a classroom 'Maker Fair'

Probing Questions:

-What coding tool did you utilize and how did you overcome coding errors?

-What was your biggest challenge? How did you overcome it?

-What technological problem solving did you find were the key to your success? (initiating, planning, performing, recording, analysing, recording, communicating)

-What were the advantages of working with a partner to complete this task?