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LESSON PLAN TEMPLATE 2023-2024

Lesson Title: Scratch Circuits Coding		**Date:**
Grade: 9	**Course/Subject/Strand:Science - Physics (Principles of Electricity)**	
Topic: Circuits	**Duration: 120 min**	**Placement in Unit Plan:** *Intro/Middle/Culminating*

LEARNING: What do we want students to learn?

Rationale for Lesson: *What are the big ideas or enduring understandings? What are learners expected to do/write/say? How does this lesson prepare them for success in the AoL task?*

Overall Expectations: *These are assessed in the lesson. (1 or 2 at most).*

A1. STEM Investigation Skills : apply scientific processes and an engineering design process in their investigations to develop a conceptual understanding of the science they are learning, and apply coding skills to model scientific concepts and relationships

D2. Investigating and Understanding Concepts: demonstrate an understanding of the nature of electric charges, including properties of static and current electricity

Specific Expectations: *These are addressed in the lesson. (1 to 3 only)*

A1.4 apply coding skills to investigate and to model scientific concepts and relationships

D2.3 identify the components of a direct current (DC) circuit and explain their functions, and identify electrical quantities, their symbols, and their corresponding International System of Units (SI) units

D2.6 construct series and parallel circuits to compare electric current, potential difference, and resistance in both types of circuits

Learning Goal(s): *Expressed in student-friendly language with a measurable verb (Bloom's) based on overall and/or specific expectations. Shared and discussed with students.*

We are learning …

We are learning how to name and identify the function essential components of currents
We are learning the standardized symbols used in circuit diagrams
We are learning to develop our coding skills and utilize artificial intelligence to create interactable programs

Success Criteria: *Shared and/or co-constructed with students as "look-fors" of quality work related to the learning goal(s). Show exemplars, rubrics, checklists, anchor charts, etc.*

I can …

I can identify and name the key components of a current
I can explain the specific functions of the components of a current
I can recognize and interpret standardized symbols used in circuit diagrams
I can utilize my coding skills to create a program using artificial intelligence

ASSESSMENT: How might students demonstrate their learning?

Assessment: FOR☐ AS☐ OF☐	**Achievement Chart Category:** K T A C
Assessment Strategy: *Directly related to the learning goal(s). Include mode (do, write, say).*	**Assessment Tool(s):** *To*

How does this assessment prepare students for the final AoL task? **Coding Assignment - students will follow steps to code their circuit while considering the function of each required component. They will need to create their own unique program including questions about each component. They will need to train their artificial intellect to ensure functionality.**	*document progression of learning and directly related to AfL/AaL/AoL.* **Assess their coding assignment using a rubric**
Learning Skills and Work Habits: *Choose 1 to 2 only.* *Responsibility/Collaboration/Initiative/Independent Work/Organization/Self-Regulation*	**Triangulation of Data:** C☐ O☐ P ☐

CONSIDERATIONS*: *How will the learning be designed to meet the needs of ALL students?

Cross Curricular connections: *What other curriculum expectations are they learning/practicing?*

Mathematics - coding is a key components of the math curriculum so this lesson will will allow students to continue to learn how to utilize coding systems to create particular programs

Visual Arts - Students will be given the opportunity to visually enhance their program, digital arts are becoming increasingly relevant so it is important to foster the development of these skills.

Prior Learning: *What knowledge and skills do students bring to this lesson?*
Students will already be familiar with using Scratch to create programs. They will have had prior opportunities to learn about and explore the system.
Students will also already be familiar with how direct and parallel currents work and what their circuits may look like through prior lessons and hands-on exploration with basic circuits.

Differentiation: *How will all learners be included? Choose one or two areas only.*

Content *- WHAT students are going to learn.*	***Process*** *- HOW students are going to learn.*	***Product*** *- WAYS in which students demonstrate learning.*	***Environment*** *- SPACE in which students learn.*
	Students may utilize a code that has been started in advance so they will just be expected to fill in all the missing variables and train the AI.	Students will be given freedom into the specifics of their final product which they may alter based on their skill sets.	

Equity, Diversity, and Social Justice: *How will all learners be included?*
Students will be given equal access to resources and they will be given time to complete their assignments at school. No students will be expected to do coding at home as access to suitable technology may be limited.
Instruction will be written in clear language, with visuals to aid students in the process. They will also be able to ask questions and reference a completed code throughout the process.

IEP: Modifications and Accommodations: *What strategies and/or materials will be Included to meet the student modifications/accommodations. Include student initials and the accompanying strategy/material for each.*
Modifications/Accommodations can be based on the requirement of the students.

Materials: *What will need to be prepared in advance for delivery of the lesson? (eg. teacher support materials and resources, student materials and resources, equipment, technology, safety considerations, etc.*
Computers or Tablets with a camera that is capable of operating scratch brilliant labs for each student. A set of reference cards for each student (Students may make their own)
Instructions
Reference Cards

Safety Precautions: *How is the safety of all students maintained throughout the delivery of this lesson?*
This is a fairly low risk activity for students to partake in as they will be using a coding program rather than being hands on with lab equipment but certain steps must be taken to mitigate risk

- Students should be aware of how to properly access the internet in a safe way (ie. not going on risky websites) and likely the students will be using a school device to ensure preventative measures are taken.

- Students will not be moving around with their devices, they will work at their desk and carry the device properly while moving.
- If cords are used for laptops or desktop computers, please be aware of the location of cords to avoid tripping.

Resources: *Resources that would be beneficial throughout this lesson.*
Ontario Curriculum Grade 9 Science
TVO Learn Grade 9 Science - Physics
https://scratch.brilliantlabs.ca/
Scratch Lesson for Beginners
Kids Britannica Electric Circuit

THREE PART LESSON

BEGINNING: (MINDS ON/HOOK/INTRODUCTION) *How will students be introduced to the lesson? How might students be engaged? What QUESTIONS will be used to activate prior knowledge? How will students be introduced to the learning goal and the success criteria of the lesson?*

The lesson would begin with prompting students to discuss what they remember from the prior lesson on circuits in which they did a hands-on activity where they were able to assemble basic circuit systems.
I would ask prompting questions such as

- Which are the parts the circuit needs? Are there parts that aren't needed?
- What do you think is the most important part of the circuit? What is your reasoning for that opinion?

Then I would show the standardized symbols used for components in a circuit and have the students try to match the symbol to their name. I would do this as the class and ask for each student's reasoning.

Afterwards, I would introduce the coding assignment. The assignment expectations would be read clearly and thoroughly with opportunities for students to ask for clarification.

Instructions

GROUPING:
W - whole group
S - small group
I - independent

TIMING:
30 minutes

MIDDLE: (APPLICATION/ACTION/PRACTICE) *How will students be provided with new learning, opportunities to demonstrate learning, opportunities for practice, time to self-assess based on the success criteria, etc.? What QUESTIONS will be used to promote deeper thinking?*

Then the students would be prompted to begin working on their assignment. This would be done independently but they would be able to work through issues with their peers or the teacher if they would like. I would circulate the room offering guidance or prompting questions.
Example

- Why did you choose to input your coding in that way?
- Can you read through your code to find the problem?
- How many times have you trained your AI? Do you think that is enough?

GROUPING:
W - whole group
S - small group
I - independent

TIMING:
60 minutes

Flexible based on how quickly the students complete the assignment

END: (CONSOLIDATION/CONNECTION) *How will students be provided with ways to bring together important ideas and make connections to real-world scenarios? What QUESTIONS will be used to assess students' attainment of the learning goals and success criteria?*

Once the students have completed their code they will send it in to the teacher as well as creating a video showing how their coding works, for grading purposes.
Example Video
They will have the opportunity to partner up with another classmate who has also completed their work to play with each other's coding.

Afterwards the students will complete a reflection (either as a written reflection or as an oral conversation depending on the students) . They will reflect on questions such as

- What were you most proud of in regards to your program?
- What was a new skill you learned throughout this assignment?
- Was there anything you would have done differently if you were to do this type of project again?
- Was there anything you had to change while doing the assignment?
- Is there any feedback or anything in general you would like the teacher to know about the assignment?

GROUPING:
W - whole group
S - small group
I - independent

TIMING:
30 minutes

Will happen on a different day from the rest of the lesson (ideally the day after the students complete the assignment)

EXTENSIONS: *What learning opportunities are available for students completing work early?*

NEXT STEPS: *What might the next learning be?*

Students will be given the opportunity to enhance their coding if they feel confident doing so (ex. Enhance the visuals, add additional questions, further train the AI, etc.) If there are multiple students with complete code they may test out each other's programs and offer respectal feedback. They may assist students who are less confident with coding complete their assignments (they must inform the teacher what specifically they helped with)	We will continue the electricity unit with a lesson and activity on energy consumption. In which they will learn how much energy the various common electrical devices use and the cost. In addition, These skills will be used for other coding assignments in this class, they will be given further freedom to use what they have learned to create their own code in a future task..

REFLECTIONS

Did the students meet the learning goal(s)? How do you know? What did the assessments tell you? How were the questions used in the lesson aligned with Bloom's taxonomy? Were the needs of ALL learners met? What went well and why? What might I change and why?