

**CODE/MOE/UOIT Makerspaces Project—Lesson Planning Template**

**School Board: Huron Superior Catholic District School Board**

**Grade(s): 6**

**Subject(s): Science—Simple Circuit Project**

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| **BIG IDEAS:**  **Electrical energy can be transformed into other forms of energy. Other forms of energy can be transformed into electrical energy. In this lesson, using the open-ended approach, students will design and create a model to demonstrate their understanding of simple circuits in Electricity.**  **Curriculum Expectations:**  **OVERALL:**  2. Investigate the characteristics of static and current electricity, and construct simple circuits  **SPECIFIC:**  2.5 use technological problem-solving skills (see page 16) to design, build, and test a device that transforms electrical energy into another form of energy in order to perform a function (e.g., a device that makes a sound, that moves, that lights up). | |
| **Learning Goals:**  “We are learning to…”  …construct a simple circuit using a variety of materials. | **Success Criteria:**  “We will be successful when…”  …our projects successfully light up or move when connected to an energy source (battery). |
| **Lesson Overview:**  After researching a variety of inventions online, students will be motivated to create a model or project of their choice which demonstrates how a simple circuit is used to transfer energy from a source to a unit (eg. food battery, light up dollhouse, card with LED lights, propeller car, etc.). | |
| **Materials and Technology:**  -Google Chromebooks (computers)  -coin batteries  -various types of wire - play doh  -LED lights - access to supplies in Makerspace Lab  -vibration motors  -scissors  -tape | |
| **Student Accommodations/Modifications:**  Students are seated according to IEP plans.  Students with IEPs will be guided towards a basic project involving very few materials in order to complete it successfully (ex. Potato or Lemon battery) | **Lesson will be differentiated by:**   * **Content, specifically:** each student will design and create their own Circuit Project using materials of their choice * **Process, specifically:** Teacher prompting throughout to ensure time is managed well * **Product, specifically:n/a** * **Environment, specifically:** students with greater behaviour needs will be placed in close proximity to teacher |
| **MINDS ON: Getting Started** | |
| During this phase, the teacher 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). | During this phase, students may:  • 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.**  The teacher will remind students about the conductor/insulator experiment that was completed previously. Students will be asked to recall what items were necessary to create a successful circuit in order to make the LED light glow.  Show the following videos:  <https://www.youtube.com/watch?v=daWU2Oh_xlg> - Artbot  <https://www.youtube.com/watch?v=Q1zToREgV0c> - Bristlebot  Ask students if they think they could create this. Explain that they will get to create a project just like this to display their knowledge of simple circuits.  **What key questions will you ask?**  Ask the students:   1. “What did the two videos have in common?” (both use simple circuits) 2. “Do you think you would be able to create something similar to this?” 3. “What types of items could you use from the Makerspace Lab to help?” (Thrust)   **How will you gather diagnostic or formative data about the students’ current levels of understanding?**  I will gather diagnostic data by assessing their understanding of basic circuits during the previous lesson on Conductors and Insulators in which they needed to create a circuit to test for energy flow.  **How will students be grouped? How will materials be distributed?**  Students will working individually on the project of their choice. On the first day, students will have a block of time to visit the Makerspace Lab and collect any materials needed for their project. This will be documented in a chart form to ensure accountability for materials and track any consumables which may need to be replaced.  Any other items required for individual projects will be brought in from the student’s home or the student will provide the teacher with a list of additional items (school will supply if not affordable for child’s family). | |
| **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);  • 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. | 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 their classmates;  • explore and develop strategies and concepts. |
| **Describe the task(s) in which your students will be engaged.**  During the initial Science block, students will research “Grade 6 Simple Circuit Projects” to become motivated and choose a project that interests them and reflects their interests.  In subsequent Science blocks, students will use their materials to independently create their project that emits light or creates movement. This activity is open-ended and students will be required to build, test, and modify their models to be successful.  **What misconceptions or difficulties do you think they might experience?**  Students may experience difficulty if their circuit is interrupted and the project does not light up or create movement. They will need to problem solve or use trial and error to rectify the problem. Some students who struggle with “learned helplessness” will require gentle prompting and guidance to ensure they are making effective use of class time.  **How will they demonstrate their understanding of the concept?**  They will demonstrate their understanding by creating a project that successfully uses electricity to emit light or move independently.  **How will you gather your assessment data (e.g., checklist, anecdotal records)?**  The teacher will walk around making anecdotal notes of how students work during the planning and building stages of their project. Students will also conference with the teacher after choosing a topic, during the building process, and upon completion of the project to discuss and reflect on their experiences at the three stages of the project.  **What extension activities will you provide?**  An extension activity will include creating a circuit diagram to demonstrate knowledge of the symbols used in the design of a device which uses electricity. | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher 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. | During this phase, students may:  • 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)?**  Upon completion of the projects, students will complete a Gallery Walk in which half of the students will stand with their project to explain and demonstrate its use to their peers. This will be repeated with the remaining students (who were the audience) now becoming the presenters and the rest will now be the audience.  The teacher will consolidate the lesson by having students complete a reflective journal entry on Google Classroom which will visible to their peers to express the highlights of the project.  **What key questions will you ask during the debriefing?**  Did you need to make any modifications during the process?  What part of the process did you find most challenging? Why?  Using the same type of circuit, what other uses could your device have? | |