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**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: Grade 5 & 6 Science:**

**Renewable and Non-Renewable Energy**

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| **Big Ideas:**   * Electrical energy can be transformed into other forms of energy. (Overall expectations 2 & 3) * Other forms of energy can be transformed into electrical energy. (Overall expectations 2 & 3) * Electrical energy plays a significant role in society, and its production has an impact on the environment. (Overall expectation 1) * Society must find ways to minimize the impact of energy production on the environment. (Overall expectation 1)   **Overall Curriculum Expectations :**   * Evaluate the impact of the use of electricity on both the way we live and the environment; * Investigate the characteristics of static and current electricity, and construct simple circuits; * Demonstrate an understanding of the principles of electrical energy and its transformation into and from other forms of energy. | |
| **Learning Goals :**   * Distinguish between renewable and non-renewable energy sources * Explain the consequences of climate change on the environment and on society at large * Design and create a device that is powered by a renewable energy source | **Success Criteria :**   * Learn about and identify the various forms of energy, including non-renewable and renewable forms * Learn the advantages and disadvantages of each type of energy * Use appropriate vocabulary (the greenhouse effect, combustion, climate change, global warming) * Make a device that respects the pre-established criteria |
| **Lesson Overview :**  **Throughout this lesson, students will :**   * Learn about the greenhouse effect * Explore combustibles * Explore the consequences of climate change and of global warming * Follow the technological problem-solving skills continuum | |
| **Materials and technology to be used :**   * Cardboard * Scissors * Tape * Small solar panels * Small motors * Glue sticks * Glue guns * Plastic or wooden dowels (rods) * Wood skewers * Straws * Elastic bands * Green Screen * iPads | |
| **Accommodations/Modifications :**   * Form heterogeneous (mixed ability) groups keeping in mind different learning difficulties * Over the course of the project, constantly remind students to use specialized vocabulary * Students will conduct research before deciding which device to make | |
| **MINDS ON:** | |
| During this phase, the teacher will :   * Show a video about climate change * Review unit vocabulary (renewable and non-renewable energy, combustion, fossil fuels, climate change, global warming, the atmosphere, heat, temperature, sea level rise) * Ask students questions to ensure their prior knowledge is sufficient for the task at hand (regarding what causes climate change) | During this phase, the students will :   * Do a think-pair-share to brainstorm ideas regarding what causes climate change * Fill out the KWL chart |
| **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?**   * Introduce the challenge and give students a “roadmap”: * Have students conduct research to decide which device they want to make * Next they have to make a plan (or blueprint) of their prototype, along with a list of materials needed to accomplish their task (the teacher can build materials or the students can bring what they need from home) * **Diagnostic** assessment will be collected while students think-pair-share and fill out the KWL chart (teacher makes anecdotal notes) | |
| **ACTION:** | |
| During this phase, the teacher will :   * Review the steps in the technological problem-solving process * Discuss important safety considerations while working with electricity * Invite students to make their prototype devices (which ultimately showcases what they have learned regarding electricity) while they follow the “roadmap” (their plan) | During this phase, the students will :   * Follow safety considerations laid out by the teacher with respect to tools, materials, electricity, etc. * Explain their thinking in terms of what they are making, and choose their partner wisely * Follow the “roadmap” they’ve created |
| **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?**   * Questioning students as they work * Research the benefits of using a form of renewable energy to power their devices * Research to understand greenhouse gases and their effect on the environment * Discuss the environmental consequences of the use of non-renewable resources. * Presentation of the final product according to the choice of format of the students * Final product may be assessed using a rubric or checklist | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher will :   * Ask students to fill-in their science journals constantly, using the following prompts:   \*What I learned \* What was difficult \* What was easy \*How can I improve my device? \* What other sources of energy could I have used? \* What are the advantages of the energy source I used for my device and what are the disadvantages of other sources of energy on the environment? \* How can I educate others about these consequences? | During this phase, the students will :   * Share their learning * Justify and explain their thinking * Reflect on their learning * Fill out their science journal |
| **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?**   * Students will receive a presentation checklist according to the format of presentation they selected (written earlier on their roadmap) * During the Maker Faire, students will present the challenge they sought to accomplish, explain the steps taken during the “making” phase, as well as important safety considerations they took into account, in addition to how their device works * They will propose different renewable energy sources they could have used for their device, explaining the advantages of each * Students will explain the consequences that non-renewable sources of energy have on the planet (coal causes acid rain which acidifies lakes and leads to fish deaths, for example) * They will present the difficulties they encountered while making, along with the ways they succeeded in following their roadmap | |