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| Grade Level | 4 | Subject | Weather |
| <p>Objective(s): The student will investigate and understand how weather conditions and phenomena occur and can be predicted.</p> | | <p>SOL Addressed: SOL 4.6 abc The student will demonstrate understanding of weather by observing weather phenomena and using tools to measure weather events and make predictions.</p> <ul style="list-style-type: none"> * Observations are made and repeated to ensure accuracy * Students will recognize, utilize, and chart observations using meteorological tools * Predictions will be formulated * Measurements will be made in metric and standard units * Questions are developed to formulate hypothesis * Data are gathered, charted, graphed, and analyzed * Unexpected or unusual quantitative data are recognized (weather data may be compared and contrasted with data collected at CEED –using the CEED dashboard.) * Inferences are made and predictions made <p>Common Core Standards: 4-PS3-2. 3-ESS2-1</p> <p>Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]</p> | |
| <p>Materials Needed Per Class of 30</p> <p>and</p> <p>Prior Knowledge</p> | | <p>Prior Knowledge: Review question from teacher: How would your life be different if you had no idea what the weather would be like from day to day? What tools do meteorologists use to predict weather?</p> <p>Students also need to know how long an inch is and measure to the 1/8 inch. They also need to understand miles per hour and concept of humidity.</p> <p>Weather tools should be explored and practiced with prior to the collection of data and forecasting begins. Students should also explore the CEED dashboard.</p> | |

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Instructional Activities

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| Ways to differentiate this lesson plan | <ul style="list-style-type: none"> • EXTENSION - record weather forecasts daily and compare and contrast student predictions and data with local meteorologist forecasts. Write reflections on how they are similar, and what techniques the professionals may use that could improve students' forecasts. • MODIFICATIONS - Students will be grouped together in small groups to highlight student strengths. | |
| Introduction/ Anticipatory Set | <p>Anticipatory Set: Questions to ask students:</p> <ul style="list-style-type: none"> • How do we know what the weather will be like from day to day? | <p>Introduction: How would life be different if we had no idea what the weather will be like each day?</p> |
| Guided Practice | <ul style="list-style-type: none"> • Students will need to be placed into teams. They will construct a mini weather station from a kit and a two liter bottle. Teams will test their weather stations and compare with school weather station data. Adjustments to student made stations will be made to improve accuracy. • Review cloud types and associated weather. • Establish a specific time that data will be collected each day. • Observances and specific data will be graphed from school weather station and CEED dashboard. –Students will use this information collectively to make weather predictions. | |
| Independent Practice | <p>Students will use weather tools at school as well as digital weather station to record current weather information. They will graph the findings from school observations as well as from the CEED dashboards. Teams will write detailed forecasts based on current data collected.</p> | |
| Closure (Summary of Lesson) | <p>Students should have their data graphed and explanations for forecasts should be written in detail.</p> | |

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Instructional Activities

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| CEED Building Application/ Sensor Data | Students will look at the CEED dashboard each day for this same week. |
| Assessment | Students completed data charts and graphs can be assessed. Students should write down their forecasts. Compare student forecasts with actual daily weather. |

INQUIRY LEARNING RESEARCH PROCESS GUIDELINES

The following table is just one guideline to use for developing your own inquiry materials. The seven steps in the Learning Research Process include not only how people learn but also how research is conducted. The heart of the design, the three-stage learning cycle of exploration, concept invention or formation, and application is embedded in the middle. In addition to these three stages, this design takes into account that learners need to be motivated to spend the time required for understanding complex subjects and that learners need to build this new knowledge onto prior knowledge. These are similar to the 5E and 7E learning models.

The Learning-Research Process

| Steps in the Learning- Research Process | 7E Equivalent | Component of the Activity |
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| 1. Identify a need to learn. | Engage | An issue that excites and interests is presented. An answer to the question <i>Why?</i> is given. Learning objectives and success criteria are defined. |
| 2. Connect to prior understandings. | Elicit | A question or issue is raised, and student explanations or predictions are sought. Prerequisite material and understanding is identified. |
| 3. Explore | Explore | A model or task is provided, and resource material is identified. Students explore the model or task in response to critical-thinking questions. |
| 4. Concept invention, | Explain | Critical-thinking questions lead to the identification of |

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| introduction, and formation | | concepts, and understanding is developed. |
| 5. Practice applying knowledge. | | Skill exercises involved straightforward application of the knowledge. |
| 6. Apply knowledge in new contexts. | Elaborate and Extend | Problems and extended problems require synthesis and transference of concepts. |
| 7. Reflect on the process | Evaluate | Problem solutions and answers to questions are validated and integrated with concepts. Learning and performance are assess |

Hanson, D. (2006). POGIL Instructor’s Guide to Process-Oriented Guided-Inquiry Learning. Lisle, IL: Pacific Crest