

Investigations	
Transdisciplinary Theme:	
<p>How the World Works</p> <p>Inquiry into the natural world and its laws, the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p>	
Central Idea (Macro Concept) List of Concepts ; sample concepts	
Investigation extends understanding.	
Lines of Inquiry (Key Concepts) - an inquiry into...	Essential Questions:
<ul style="list-style-type: none">Identifying ways objects are made (form)Analyzing components within substances (connection)Mixtures create something new (causation)	<ul style="list-style-type: none">How are mixtures similar and different from the original materials?What is the form of a mixture and how can it change?How does the mass of a mixture change?When reactions or changes in properties occur, does the total weight of the substance change?<ul style="list-style-type: none">(Cause and effect relationships are routinely identified)
<p>Briefly answer the questions below.</p> <p>How did the strategies we used throughout the unit help to develop and evidence students’ understanding of the central idea?</p> <p>The science and engineering practices allowed for students to hypothesize, practice, and then research. They were able to investigate and use their ATL research skills to gather information in science but also in literacy as they started working on their expository/informative. The work we were doing in math and the strategies they were learning about decimals really supported investigating how the world works in science.</p> <p>What would you like to remember about the section above for next year?</p> <p>Overall, the unit went well with students able to find understanding. Some ideas did not develop because we had to move on to the next topic. For example, we just introduced atoms. The vocabulary around atoms, plasticity, solubility, and property really needs to be front loaded to help students have the knowledge to move forward with their science experiments. With music, to really keep vocabulary for this unit in the forefront...etc. property, vibration speed, heat, cool, expansion on instruments. <u>Use the vocabulary down under the resource section.</u></p>	
Big Ideas of the Unit:	
<p>Patterson International’s POI - This link provides our school's programme of inquiry for each grade level. This will help you know what students should have knowledge about before your grade, and what they are expected to learn after your grade. This could help you know prior knowledge that students are coming with to this unit.</p> <p>What connections are there to learning within and outside the unit of inquiry? What opportunities are there for students to develop conceptual understandings to support the transfer of learning across, between, and beyond subjects?</p> <p>Structure and Properties of Matter (35-40 days)</p> <p><i>How can one explain the structure, properties, and interactions of matter?</i> Students will understand that: Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. Measurements of a variety of properties (e.g., hardness, reflectivity) can be used to identify particular materials.</p> <p><i>How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?</i> Students will understand that: When two or more different substances are mixed, a new substance with different properties may be formed; such occurrences depend on the substances and the temperature. No matter what reaction or change in properties occurs, the total weight of the substances does not change.</p>	
Learning Goals and Success Criteria	
<p>What do you want students to know, understand and be able to do?</p> <p>Provide the learning targets you are addressing from the student proficiency scales in Bridge to Curriculum. Please make sure to include all 3.0 proficiency scale learning targets that you will address. Link the proficiency scales you are using to this document so you can quickly open them up and see the 2.0 scaffolds that you might have to use for some of the students. The student proficiency scales are preferred, but you may use the other proficiency scales if you choose.</p> <p>Science: Structure and Properties of Matter</p> <p>Student Friendly Proficiency Scale</p> <div><ul style="list-style-type: none">A model showing that gasses are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)The amount (weight) of matter is conserved when it changes form. (5-PS1-2)When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)</div>	
Common Assessments and Summative Task to Guide Instruction:	
What do you want students to know, understand and be able to do? How are learning goals and success criteria co-constructed between teachers and students?	

<p>List the pretest, or provocation, you will use to learn more about your students at the beginning of this unit. Think about how this information might guide future learning experiences for your students.</p> <p>Pretest/Provocation</p> <ul style="list-style-type: none">● Matter Pre-test● Iron in the cereal? What are things made up of and what mixtures can we not see within certain substances?● Students are asked to list the states of water, and if they know what matter is. <p>Pre-Assessment Link</p> <p>Tool: see Link to activities</p> <p>List the summative, or end of unit task, you will use to gather information about what your students learned in this unit.. How might students help co-construct the success criteria for the summative?</p> <p><u>Formative Assessment</u></p> <p><u>Task:</u> Engineering Design: Cell Phone Floatation Device</p> <p>Slide show of task</p> <p>Engineering Design website</p> <p><u>Evidence:</u> Students will be able to</p> <ul style="list-style-type: none">- apply what they have learned about chemical reactions to control the amount of product produced.- Identifying ways objects are made (form)- Analyze components within substances (connection)- Explain how mixtures create something new (causation) <p><u>Tool:</u> Presentation rubric</p> <p><u>Summative/End of Unit Task</u></p> <p>Task: Post-test</p> <p>Evidence: Students show growth from pretest and can explain about various elements in-depth.</p> <p>Task: Invention Essay</p> <p>Evidence: Student can identify way object is made (form), analyze components within substance (connection), explain how mixture created something new (causation)</p> <p>Tool: Writing Rubric from HMH</p> <p><u>Task:</u> Students will create their own science experiment and go through the entire science and engineering practices with a focus on one of the lines of inquiries. They will also name the research skill that they will be using while working on the experiment.</p> <p><u>Evidence:</u></p> <p>-Create their own question to an experiment</p> <p>-Clearly state the steps of the science and engineering practices.</p> <p>-Clearly state the line of inquiry they are focused on and write which of the research skills they will be using during the experiment.</p> <p><u>Tool:</u></p> <p>-Rubric will be used to grade the scientific method and question.</p> <p>Rubric</p>		
<p><i>Learner Profile:</i> Learner Profile Posters</p>	<p><i>Approaches to Learning:</i> ATL Posters</p>	<p><i>Action That Might Come:</i> Action Category Posters</p>
<p>List 2-3 learner profile attributes that students will focus on for this unit. All learner profile attributes should be included in a planner at least once at each grade level. The link above will lead you to the attributes of the Learner Profile.</p> <ul style="list-style-type: none">● Inquirer● Reflective● Thinker	<p>List the ATL skills that will be focused on for this unit. All ATL skills should be included in a planner at least once at each grade level. The link above will lead you to the attributes for each ATL.</p> <p>Research Skills -</p> <ul style="list-style-type: none">● I ask questions that are connected to what I want to learn.● I observe all the different details.● I plan for what I am going to do and I think of how I will get my information.● I know how to gather information from different resources.	<p>What opportunities are there for building on prior learning to support potential student-initiated action?</p> <p>5th-thinking about how scientists create mixtures and use the science and engineering practices to solve world problems. The Covid vaccine is a mixture that needed to be created and went through the process that students will be researching. (Advocacy)</p> <p>Music - students might form an ensemble or band based on their understanding of mixtures of instrumental sounds.</p>

Grade: 5th Grade	Teachers: Espinal, Bistram, Linkenauer	Timeline: Sept-Oct 2022
	<ul style="list-style-type: none">I can record data in many different ways.I can organize my information in a way that others can understand it.I can make new decisions because of the data I collected.I can communicate to others what I have learned.Students will have many different experiments that will require them to make observations, plan, collect data, organize data, interpret data, and preserve research findings.	(Participation)
<p>Briefly answer the following questions below after the unit of inquiry is over.</p> <p>What learning experiences best supported students’ development and demonstration of the attributes of the learner profile and approaches to learning?</p> <p>The learning experiences that best support their learning were the experiments that allowed for hands-on practice. Students were really engaged and were able to ask a lot of questions. Working in groups also allowed for the discussion that enriched their understanding, as well as improvement in communication skills. They had to use the ATL research skills (questioning and obtaining the answer to the why). Inquirer was the largest profile in this unit. They focused a ton on questioning throughout our day. Exploring and writing the essay about an inventor/invention really helped kids make connections to how matter/chemistry is used in the real-world. Took learning from the abstract to concrete for many.</p> <p>How effective was our monitoring, documenting and measuring of learning informing our understanding of student learning?</p> <p>The discussions and the write-ups during the experiments gave evidence of students' understanding because they had to apply that each time they went through. Class discussions helped us know if they were understanding larger concepts. Generation Genius also used Kahoot to help us measure what students were gaining in knowledge. Actively Learn is a great resource that allows you to assess understanding through multiple choice and written questions.</p> <p>What would you like to remember about the section above for next year? We want to really think about an actionable problem that can lead us through this unit. Introduce engineering task sooner?? It seems like this unit was very subject based because we did not have a problem/provocation that would transfer into other subjects very well. The lines of inquiry and essential questions probably need to be rewritten so they are more transdisciplinary and can transfer throughout the day/learning.</p>		

DESIGNING AND IMPLEMENTING		
<p>Resources to support this unit: <u>List resources that you will want to remember for this unit. It might be a good idea to create a different Google Document with all the resources and hyperlink it to this unit.</u></p> <p>Investigations Vocabulary</p> <p>American Chemical Society - Fifth Grade Lessons</p> <p>Generation Genius</p> <p>Actively Learn</p>		
<p>What are our learning goals?</p> <p>-List the line of inquiry you are focused on with this set of lessons.</p> <p>-List the learning target or essential question you will use with your students for this set of lessons.</p>	<p>What are the learning experiences?</p> <p>-What is the student task?</p> <p>-Which resources are needed?</p> <p>-Have you thought about differentiation?</p> <p>-How is it connected to ATL and/or Learner Profile?</p> <p>-Does it match what you are trying to achieve in the first column?</p> <p>-Have you thought about what the students are interested in learning while creating these experiences?</p>	<p>How will we show our learning?</p> <p>-What evidence will you gather from students to make sure they are meeting the learning goals?</p>
<p>You can add rows below if you run out of room. To add a row, right click on the row above where you want to add a row. Then go to the tab that says “insert row below.” It is difficult to capture all lessons throughout the day, so add the key lessons that connect directly with your lines of inquiry and can guide any teacher through this unit.</p>		
<p>Preplan the unit:</p> <p>2022 SEE HERE FOR SCIENCE UNIT PROGRESSION: 5th Grade Matter Unit</p> <p>Previous Unit Activities:</p>		
<p>What are our learning goals?</p>	<p>What are the learning experiences?</p>	<p>How will we show our learning?</p>
<ul style="list-style-type: none">Identifying ways objects are made (form)	<p>Look at states of matter</p> <ul style="list-style-type: none">How does molecular structure change for each form?How atoms create moleculesWater cycle	<ul style="list-style-type: none">Diagrams and/or modelsConstructed responsesDiscussGroup conversation during experimentsLab packetsInvention/Inventor Essay

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<ul style="list-style-type: none">Mixtures create something new (causation)	<ul style="list-style-type: none">Mixture vs solutionPhysical vs. chemical changeConservation of mass	<ul style="list-style-type: none">Simulation for conservation of massConstructed responsesDiscussGroup conversation during experimentsLab packetsEssay
<ul style="list-style-type: none">Analyzing components within substances (connection)	<ul style="list-style-type: none">Dissolving process (positive and negative charges)EvaporationPhysical propertiesElements	<ul style="list-style-type: none">ExperimentsDiscussionsConstructed responsesModels

Transdisciplinary Lessons to Support the Unit	
Subject	Lesson
Music	<ul style="list-style-type: none">What are the characteristics of each instrument?How do the instruments support and complement each other?How do different combinations of instruments affect the sound of the music? (Mixtures create something new.)<ul style="list-style-type: none">EnsemblesOrchestrationGenres - Rock vs Hip Hop vs Country vs EDM etc. (Genres are comprised of mixtures of instruments)

What are the student inquiries/questions? -Write the inquiries/questions below. -Indicate in the lessons above where students were able to explore some of these inquiries/questions.	How are students taking action? Action Category Posters -Write the actions taken below. -What type of action were they exploring?
<ul style="list-style-type: none">If styrofoam dissolves in acetone, why don't trash companies do this to prevent more waste?How did people decide which materials were safe for cooking?How are new things created?How is chemistry used today?Why do things melt/freeze at different temperatures?How does magnetism work?Why are some things soluble and others are not?How are some gasses heavier than others?	<ul style="list-style-type: none">Many students created additional experiments at homeFinding out about other inventionsTrying to make their own mixtures

Make sure to respond to all the reflection questions below about the yellow boxes above.

What evidence do we have that students are developing knowledge, conceptual understandings and skills to support the transfer of learning across, between and beyond subjects?

Most students seemed to have a good understanding of states and properties of matter and how they are used in our every day lives. I heard students talk about whether their smoothie was a liquid or solid, trying to find ways to create a new substance, and using a particle model to explain why the room was so cold. All of this tells me that students have internalized the learning enough to be applying it to their every day lives. They are making connections and seeing how investigation leads to answers. Students used the research skills weekly throughout this unit, both during experiments and while researching for their essays. They used them to understand science concepts and also used research skills in all subjects. While students were learning how to research in science they were also researching for informative writing. These skills transferred with their theme of investigating. They investigated in their reading as well and looked for inquirers to learn more about the stories they were reading.

What student initiated inquiries arose and how did they inform the process of inquiry? What adjustments were made, and how did this enrich learning?
From many of the in-class experiments and Generation Genius, students found several concepts that they connected to and wanted to do additional research. Since many of the experiments focused on the process of dissolving and crystallization, several students started growing crystals at home. Other experiments used baking soda so several students began doing experiments at home using baking soda. In one video they learned how pressure can change based on temperature and the surroundings. This led students to look into how during recess in winter the inflation on playground equipment changed. They also started asking about tire pressure while living in a cooler region during winter. We began to investigate how our temperature can impact the everyday items around us.

How are students supported in having voice, choice and ownership in the unit of inquiry?
Students were encouraged to find an invention that they were interested in how it was created. They were able to choose something or someone of their own choice. Students had opportunities to choose their own experiment to create and research. They needed to connect to a line of inquiry, and used their research skills to understand. Students also had chances to choose groups to work with during different experiments and find ways to share their learning. They were able to create Google Slides, or other forms to teach what they learned during the unit.

What would you like to remember about the section above for next year?
Might be fun to start a science fair!
Hammonds Factory would be a great field trip to support this unit. [Hammond's Candy Factory](#)

Other notes: