**Accelerating Learning—A 8th Grade Science Example**

**Can we use the data from pre-assessments, critical junctures, post assessments, and On-The-Fly formative assessments from previous units to guide out pre-unit planning? Focus on the progressions of the Science and Engineering Practices and Crosscutting Concepts as specific Disciplinary Core Ideas are taught within the upcoming unit and pre-assessment data can be used to ascertain that information.**

**Example of Acceleration**: **8th Grade, Unit 5 - Natural Selection**

There are 5 “power” standards bundled together in Unit 3:

08-LS2-4 08-LS3-1 08-LS4-4 08-LS4-5 08-LS4-6

which include the following:

* **Crosscutting Concepts:**
  + Stability and Change
    - Small changes in one part of a system might cause large changes in another part.
  + Structure and Function
    - Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.
  + Cause and Effect
    - Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.
* **Science & Engineering Practices:**
  + Engaging in Argument from Evidence
    - Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.
  + Developing and Using Models
    - Develop and use a model to describe phenomena.
  + Constructing Explanations and Designing Solutions
    - Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena.
  + Obtaining, Evaluating, and Communicating Information
    - Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.
  + Using Mathematics and Computational Thinking
    - Use mathematical representations to support scientific conclusions and design solutions.
* **Disciplinary Core Ideas:**
  + LS2.C: Ecosystem Dynamics, Functioning, and Resilience
    - Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.
  + LS3.A: The Roles of Water in Earth’s Surface Processes
    - Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits.
  + LS3.B: Human Impact on Earth Systems
    - In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism.
  + LS4.B: Natural Selection
    - Natural selection leads to the predominance of certain traits in a population, and the suppression of others.
    - In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring.
  + LS4.C: Adaptation
    - Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.

**Before** beginning the unit, compare the 8th grade expectations to the 7th grade expectations. Look for specific alignments in each of the dimension progressions. The variation between the two grade levels identifies your targeted learning. Use data from the pre-assessment to determine which students need extra support in each dimension.

|  |  |  |
| --- | --- | --- |
| **3 Dimensional Progressions for Each Dimension in the Bundled Standards** | | |
|  | 7th Grade | 8th Grade |
| Stability and Change | * explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. * learn changes in one part of a system might cause large changes in another part. | * explain stability and change in natural or designed systems by examining changes over time, and considering forces at different scales, including the atomic scale. * learn changes in one part of a system might cause large changes in another part * systems in dynamic equilibrium are stable due to a balance of feedback mechanisms, and stability might be disturbed by either sudden events or gradual changes that accumulate over time |
| Structure and Function | * students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among its parts. * analyze complex natural and designed structures and systems to determine how they function. | * students model complex and microscopic structures and systems and visualize how their function depends on the shapes, composition, and relationships among its parts. * analyze many complex natural and designed structures and systems to determine how they function. * design structures to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. |
| Cause and Effect | * classify relationships as causal or correlational, and recognize that correlation does not necessarily imply causation. * use cause and effect relationships to predict phenomena in natural or designed systems. | * classify relationships as causal or correlational, and recognize that correlation does not necessarily imply causation. * use cause and effect relationships to predict phenomena in natural or designed systems. * understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. |
| Engaging in Argument from Evidence | * compare two arguments on the same topic and analyze whether they emphasize similar or different evidence or interpretations of facts. * respectfully provide and receive critiques about one’s explanations, procedures, models, and questions by citing relevant evidence. * construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. * evaluate competing design solutions. | * compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts. * respectfully provide and receive critiques about one’s explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail. * construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. * evaluate competing design solutions based on jointly developed and agreed-upon design criteria. |
| Developing and Using Models | * evaluate limitations of a model for a proposed object or tool. * modify a model— based on evidence – to match what happens if a variable or component of a system is changed. * use a model of simple systems with uncertain and less predictable factors. * revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. * use a model to predict or describe phenomena. * use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales. | * evaluate limitations of a model for a proposed object or tool. * develop or modify a model— based on evidence – to match what happens if a variable or component of a system is changed. * use and/or develop a model of simple systems with uncertain and less predictable factors. * develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. * develop and/or use a model to predict and/or describe phenomena. * develop a model to describe unobservable mechanisms. * develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales. |
| Constructing Explanations and Designing Solutions | * construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) or describe(s) phenomena. * construct an explanation using models or representations. * construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. * apply scientific ideas, principles, or evidence to revise or use an explanation for real world phenomena, examples, or events. * apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion. * apply scientific ideas or principles to design, construct, or test a design of an object, tool, process or system. | * construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s) phenomena. * construct an explanation using models or representations. * construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. * apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real world phenomena, examples, or events. * apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion. * apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system. |
| Obtaining, Evaluating, and Communicating Information | * critically read scientific texts adapted for classroom use to determine the central ideas or obtain scientific or technical information to describe patterns in or evidence about the natural and designed world(s). * integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings. * gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used. * evaluate data, hypotheses, or conclusions in scientific and technical texts in light of competing information or accounts. * communicate scientific or technical information (e.g. about a proposed object, tool, process, system) in writing or through oral presentations. | * critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s). * integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings. * gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. * evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts. * communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations. |
| Using Mathematics and Computational Thinking | * use digital tools (e.g., computers) to analyze data sets for patterns and trends. * use mathematical representations to describe or support scientific conclusions and design solutions. * create algorithms (a series of ordered steps) to solve a problem. * apply mathematical concepts or processes (e.g., ratio, rate, percent, basic operations) to scientific and engineering questions and problems. | * use digital tools (e.g., computers) to analyze very large data sets for patterns and trends. * use mathematical representations to describe and/or support scientific conclusions and design solutions. * create algorithms (a series of ordered steps) to solve a problem. * apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems. |
| LS2.C: Ecosystem Dynamics, Functioning, and Resilience | When the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. | Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. |
| LS3.A: The Roles of Water in Earth’s Surface Processes | Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops. | Genes chiefly regulate a specific protein, which affect an individual’s traits. |
| LS3.B: Human Impact on Earth Systems | In sexual reproduction, each parent contributes half of the genes acquired by the offspring resulting in variation between parent and offspring. Genetic information can be altered because of mutations, which may result in beneficial, negative, or no change to proteins in or traits of an organism. |
| LS4.B: Natural Selection | Differences in characteristics between individuals of the same species provide advantages in surviving and reproducing. | Both natural and artificial selection result from certain traits giving some individuals an advantage in surviving and reproducing, leading to predominance of certain traits in a population. |
| LS4.C: Adaptation | Particular organisms can only survive in particular environments. | Species can change over time in response to changes in environmental conditions through adaptation by natural selection acting over generations. Traits that support successful survival and reproduction in the new environment become more common. |

**Accelerated Instruction:**

Begin by teaching a whole group lesson on the **grade level standard** with a defined learning intention and success criteria.

Depending on where you are in your instructional pace for the year, you work with your PLC to determine whether you move forward with the full curriculum, use the Amplify @Home condensed units or a combination thereof focusing on the deficiencies identified in the initial assessing.

Based on the formative assessments and initial data collection you may add or emphasize specific dimensions as needed for your class. Do plan on using Progress Build progressions to measure acquisition of proficiency. Active planning and preparedness are of the utmost importance. For those students who struggle, additional guided instruction may be required.

Make the greatest use you can of the resources you have been provided. Don’t be hesitant to use the pre-recorded activities for additional guidance at home or in a virtual at home setting in order to provide ongoing instruction.

Use your pre, critical juncture, post assessments to determine growth areas as well as areas which still need to be addressed in additional instructional settings. Remember that the dimensions spiral across the year as well as year to year. Be cognizant of the fact that proficiency in the early part of the year will look different from proficiency at the end of the year as students continue their growth and progress. Decide with your PLC what level of mastery is expected for the point of the year you are in and assess to that level and above.

**We also strongly believe that teachers need to include independent reading in their units. Students get better at reading by reading.**