

## Connecting to the *Next Generation Science Standards* (NGSS Lead States 2013)

Standard  
MS-LS4-5 Biological Evolution: Unity and Diversity  
[Link](#)

The chart below makes one set of connections between the instruction outlined in this article and the *NGSS*. Other valid connections are likely; however, space restrictions prevent us from listing all possibilities.

Dimensions	Classroom Connections
<p>Science and Engineering Practices</p> <p><b>Obtaining, evaluating, and communicating information</b></p> <ul style="list-style-type: none"> <li>Evaluate the merit and validity of ideas and methods</li> <li>Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and method used, and describe how they are supported or not supported by evidence.</li> </ul>	<ul style="list-style-type: none"> <li>Students gather, read, and synthesize scientific and ethical-based information from multiple sources about technologies that have changed the way humans influence the inheritance of traits in organisms</li> <li>Students use foundational content about genetics and ethics-based argumentation while engaging in evaluative role-playing discourse about scientists' responsibilities towards their creations.</li> <li>Students write a letter summarizing and clarifying their claim about what actions should take place in society about gene-editing and why they have come to this perspective using supporting evidence from oral, textual, and media-based information</li> </ul>
<p>Disciplinary Core Ideas</p> <p>LS4.B Natural Selection</p> <ul style="list-style-type: none"> <li>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 on to offspring.</li> </ul>	<ul style="list-style-type: none"> <li>Students role play scientists who use CRISPR, a gene editing tool, to influence characteristics of organisms. Students explain how genes and gene editing works to influence the characteristics of their imaginary creations.</li> </ul>
<p>Crosscutting Concepts</p> <p>Cause and Effect</p> <ul style="list-style-type: none"> <li>Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across different contexts and used to predict and explain events in new contexts</li> </ul>	<ul style="list-style-type: none"> <li>Students design and record a set of genes to code for the likelihood or probability of traits in an organism.</li> <li>Students make a creation that expresses the genome they designed.</li> <li>Students imagine and debate the possibility of multifaceted outcomes of gene editing in society</li> </ul>

*Building Towards Performance Expectation (PE listing with Clarification Statement and Assessment Boundary)*

**MS-LS4-5** Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms. [Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, and gene therapy): and on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.]

Connections to the NGSS Appendices H & J	
Concept	Classroom Connections
<p>Appendix H Understanding the Scientific Enterprise: The Nature of Science in the Next Generation Science Standards</p> <ul style="list-style-type: none"> <li>Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers. Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity. Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas.</li> <li>Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.</li> </ul>	<ul style="list-style-type: none"> <li>Students from different social, cultural, and ethnic backgrounds role play scientists . Students demonstrate reasoning, logic, imagination, tolerance of ambiguity, intellectual honesty, skepticism, and openness to new ideas in their narrative role play.</li> <li>Students consider scientific knowledge and social factors when they describe the potential effects of gene editing.</li> <li>Students consider societal needs, desires, and values when they debate the topic of gene editing from the perspective of scientists, "creations", and the public.</li> </ul>
<p>Appendix J Science, Technology, Society, and the Environment.</p> <ul style="list-style-type: none"> <li>The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.</li> </ul>	<ul style="list-style-type: none"> <li>Students consider societal needs, desires, and values when they debate the topic of gene editing from the perspective of scientists, "creations", and the public.</li> <li>Students use the findings of scientific research when they engage in narrative role play and write a convincing argument about the potential uses and limits of gene editing in society and in the environment.</li> </ul>

Connections to the *Common Core State Standards* (NGAC and CCSSO 2010)

ELA

[Link](#)

CCSS.ELA-LITERACY.W.6.1

Write arguments to support claims with clear reasons and relevant evidence.

CCSS.ELA-LITERACY.W.6.1.B

Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.