



# ADAPTATION THROUGH VARIATION

## Overview

Book: *Feed* by M.T. Anderson

Grades 9-12

In this science PBL, students research natural selection and adaptation in a species. Then students predict how humans will adapt in the future because their bodies are now integrated with the Feed or because they travel to areas with varying gravity. The students’ research will then be presented in a documentary format.

Time frame: Allow 7-12 class periods.

## Standards

HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
JS-LS4-5	Evaluate evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
RST.9-12.1	Cite specific textual evidence to support analysis of science and technical texts.
RST. 9-12.8	Distinguish among fact, reasoned judgement based on research findings, and speculation in text.
W.9-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.9-12.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
SL.9-12.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
SL.9-12.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

## Objectives

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Students will construct an explanation on how natural selection leads to adaptation of populations.

Students will use supporting evidence to explain how environmental conditions affect populations and species.

Students will conduct research and document at least 7 resources.

Students will formulate a hypothesis on how natural selection might affect the humans in the book *Feed*.

Students will explain the reasoning behind their hypothesis that include the 5 basic steps of natural selection.

Students will organize information into a storyboard format.

Students will present their research, hypothesis, and reasoning in a documentary format.

## Materials Required

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Access to internet or library

Software to create a film

## Prior Knowledge

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Students should have a firm grasp of the concept of natural selection.

Students need to be able to create a storyboard to organize concepts into a film format.

Students need to have had experience working with online resources to create a film.

## Procedure

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1. Review with students that natural selection is a simple mechanism that causes populations of living things to change over time. There are five basic steps. These can be remembered with the acronym VISTA.  
V-variation  
I – inheritance  
S-selection  
T-time  
A – adaptation
2. Divide students into groups.
3. Tell students that they need to research examples of natural selection. This information should be used as the base to formulate a hypothesis of how the humans in the story will adapt now that the Feed is integrated into their bodies. Or the hypothesis can describe how humans will change now that they are living in various degrees of gravitational pull.
4. Students should cite at least 7 resources.
5. Meet with student groups to have them explain their research, hypothesis, and supporting details before moving on to the documentary.
6. Once students complete their research they should construct a storyboard to organize the documentary.
7. Give students time to create the documentary film.
8. Allow class time to show and discuss student films.

## Extensions

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W.9-12.3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
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1. Have students write a story about humans who have acquired the adaptation put forth in their hypothesis.
2. Encourage students to read about Charles Darwin, Jean-Baptiste Lamarck, and Georges Cuvier.

- Provide art materials so that students can create a drawing or model of the adaptation they predict.

## Rubric

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<b>RUBRIC</b>	<b>Exceeds (3)</b>	<b>Meets (2)</b>	<b>Partially Meets (1)</b>	<b>Does Not Meet (0)</b>
Research	Eight or more resources are cited	Seven resources are cited	Three to six resources are cited	Two or fewer resources are cited
Hypothesis	Hypothesis is science based extremely logical	Hypothesis is science based and somewhat logical	Hypothesis is not science based and not logical	Hypothesis not present
Reasoning and supporting details (present in documentary)	VISTA concepts are all present and explanation of concepts is well thought out.	VISTA concepts are all present with some supporting explanation	Three – four VISTA concepts are present with vague supporting explanation	Two or fewer VISTA concepts are present with no supporting explanation
Storyboard	Storyboard is well thought out with 16 or more scenes depicted	Storyboard is well thought out with 12-15 scenes depicted	Storyboard is disorganized with 8-11 scenes depicted	Storyboard is disorganized with 7 or fewer scenes depicted
Documentary organization	Documentary follows storyboard and scene transitions are handled to enhance	Documentary follows storyboard and most scene transitions are logical	Documentary somewhat follows storyboard, but scene transitions are	Documentary does not follow storyboard and scene transitions are not logical

	continuity		not logical	
Documentary Appearance	Visuals are varied, stunning, clear, and enhance the concepts presented.	All visuals are clear and enhance the concepts presented.	Some visuals are clear and some enhance concepts presented.	Visuals are not clear and do not align to concepts
Total N/21				

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