# 3. Unit 3- Ecology: Human Activity, Climate, and Biodiversity (Life, Earth and Space Science, Engineering Design)

Content Area: **Science**
Course(s): **Biology H/Lab**
Time Period: **JanFeb**
Length: **25 Days**
Status: **Published**

## Title Section

## Department of Curriculum and Instruction

**Belleville Public Schools**

**Curriculum Guide**

# Biology H, High School

# Ecology: Human Activity, Climate, and Biodiversity

**Belleville Board of Education**

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## Unit Overview

In this unit of study, students examine factors that have influenced the distribution and development of human society; these factors include climate, natural resource availability, and natural disasters. Students use computational representations to analyze how earth systems and their relationships are being modified by human activity. Students also develop an understanding of how human activities affect natural resources and of the interdependence between humans and Earth's systems, which affect the availability of natural resources. Students will apply their engineering capabilities to reduce human impacts on earth systems and improve social and environmental cost–benefit ratios. The crosscutting concepts of cause and effect, systems and systems models, stability and change, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for the disciplinary core ideas. Students will analyze and interpret data, use mathematical and computational thinking, and construct explanations as they demonstrate understanding of the disciplinary core ideas.

In this unit of study, mathematical models provide support for students' conceptual understanding of systems and students' ability to design, evaluate, and refine solutions for reducing the impact of human activities on the environment and maintaining biodiversity. Students create or revise a simulation to test solutions for mitigating adverse impacts of human activity on biodiversity. Crosscutting concepts of systems and system models play a central role in students' understanding of science and engineering practices and core ideas of ecosystems. Mathematical models also provide support for students' conceptual understanding of systems and their ability to develop design solutions for reducing the impact of human activities on the environment and maintaining biodiversity.

## Enduring Understanding

- Empirical evidence is required to differentiate between cause and correlation and make claims about how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activities
- Current models predict that, although future regional climate changes will be complex and will vary, average global temperatures will continue to rise.
- The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases are added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere.
- Although the magnitude of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts
- When evaluating solutions, it is important to take into account a range of constraints, including costs, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

## Essential Questions

- How do humans depend on Earth's resources?
- How and why do humans interact with their environment and what are the effects of these interactions?
- Would we treat our resources and life support system if we were on a rocket headed for Mars as we do in our community right now?
- How do human activities influence the global ecosystem?
- What are the relationships among earth's systems and how are those relationships being modified due to human activity?
- What is the current rate of global or regional climate change and what are the associated future impacts to Earth's systems?
- How can the impacts of human activities on natural systems be reduced?
- How might we change habits if we replaced the word "environment" with the word "life support system"?
- Does reducing human impacts on our global life support system require social engineering or mechanical engineering?
- Is the damage done to the global life support system permanent?

## Exit Skills

By the end of this Unit Biology Students should be able to

- Construct an explanation based on valid and reliable evidence for how the availability of natural

resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- Use a computational representation to illustrate the relationships among Earth systems and how these relationships are being modified due to human activity.
- Analyze geosciences data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
- Quantify and model change and rates of change in geosciences data and rates of global or regional climate change and associated impacts to Earth systems.
- Evaluate or refine a technological solution that reduces impacts of human activities on natural systems based on scientific knowledge and student generated sources of evidence; prioritize criteria and trade-off considerations
- Relate exponential growth to human populations
- Compare and contrast resource use with sustainable development
- Analyze the importance of using Earth's resources wisely
- Devise ways to preserve biodiversity
- Theorize why developed countries leave a larger ecological footprint that underdeveloped nations

## New Jersey Student Learning Standards (NJSLS-S)

NextGen Science Standards

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| 9-12.HS-ESS3-5 | Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems. |
| 9-12.HS-ESS3-4 | Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. |
| 9-12.HS-ESS3-3 | Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity. |
| 9-12.HS-ESS3-1 | Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. |
| 9-12.HS-ESS3-6 | Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. |
| 9-12.HS-ESS1-5.1.1 | Empirical evidence is needed to identify patterns. |
| 9-12.HS-ESS1-1.2.1 | Develop a model based on evidence to illustrate the relationships between systems or between components of a system. |
| 9-12.HS-ESS1-1.3.1 | students understand the significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. They recognize patterns observable at one scale may not be observable or exist at other scales, and some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly. Students use orders of magnitude to understand how a model at one scale relates to a |

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| | model at another scale. They use algebraic thinking to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth). |
| 9-12.HS-ESS1-4.3.1 | Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth). |
| 9-12.HS-ESS1-3.5.1 | In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved. |
| 9-12.HS-ESS1-4.5.1 | Use mathematical or computational representations of phenomena to describe explanations. |
| 9-12.HS-ESS1-6.6.1 | Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. |
| 9-12.HS-ESS1-6.7.1 | students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability. |
| 9-12.HS-ESS1-5.7.1 | Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. |
| 9-12.HS-ESS1-3.8.1 | Communicate scientific ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). |
| 9-12.HS-ESS1-1.PS3.D.1 | Nuclear Fusion processes in the center of the sun release the energy that ultimately reaches Earth as radiation. |
| 9-12.HS-ESS1-3.ESS1.A.1 | The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth. |
| 9-12.HS-ESS1-1.ESS1.A.1 | The star called the sun is changing and will burn out over a lifespan of approximately 10 billion years. |
| 9-12.HS-ESS1-3.ESS1.A.2 | Other than the hydrogen and helium formed at the time of the Big Bang, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy. Heavier elements are produced when certain massive stars achieve a supernova stage and explode. |
| 9-12.HS-ESS1-4.ESS1.B.1 | Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system. |
| 9-12.HS-ESS1-5.ESS1.C.1 | Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. |
| 9-12.HS-ESS1-6.ESS1.C.1 | Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have changed little over billions of years. Studying these objects can provide information about Earth's formation and early history. |
| 9-12.HS-ESS1-5.ESS2.B.1 | Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history. |
| 9-12.HS-ETS1-4 | Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. |
| 9-12.HS-ETS1-2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. |
| 9-12.HS-ETS1-1 | Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. |

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| 9-12.HS-ETS1-3 | Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. |
| 9-12.HS-ETS1-1.1.1 | Analyze complex real-world problems by specifying criteria and constraints for successful solutions. |
| 9-12.HS-ETS1-4.4.1 | Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows— within and between systems at different scales. |
| 9-12.HS-ETS1-4.5.1 | Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. |
| 9-12.HS-ETS1-2.6.1 | Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. |
| 9-12.HS-ETS1-3.6.1 | Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. |
| 9-12.HS-ETS1-1.ETS1.A.1 | Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. |
| 9-12.HS-ETS1-1.ETS1.A.2 | Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. |
| 9-12.HS-ETS1-4.ETS1.B.1 | Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. |
| 9-12.HS-ETS1-3.ETS1.B.1 | When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. |
| 9-12.HS-ETS1-2.ETS1.C.1 | Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. |
| 9-12.HS-LS2-8 | Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. |
| 9-12.HS-LS2-7 | Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. |
| 9-12.HS-LS4-6 | Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. |
| 9-12.HS-LS2-6 | Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. |
| 9-12.HS-LS4-6.2.1 | students understand that empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed systems. They also propose causal relationships by examining what is known about smaller scale mechanisms within the system. They recognize changes in systems may have various causes that may not have equal effects. |
| 9-12.HS-LS2-8.2.1 | students understand that empirical evidence is required to differentiate between cause and correlation and to make claims about specific causes and effects. They suggest cause and effect relationships to explain and predict behaviors in complex natural and designed |

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| | systems. They also propose causal relationships by examining what is known about smaller scale mechanisms within the system. They recognize changes in systems may have various causes that may not have equal effects. |
| 9-12.HS-LS4-6.5.1 | Create or revise a simulation of a phenomenon, designed device, process, or system. |
| 9-12.HS-LS2-8.7.1 | Evaluate the evidence behind currently accepted explanations to determine the merits of arguments. |
| 9-12.HS-LS2-6.7.1 | Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. |
| 9-12.HS-LS2-7.7.1 | students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability. |
| 9-12.HS-LS2-6.7.1 | students understand much of science deals with constructing explanations of how things change and how they remain stable. They quantify and model changes in systems over very short or very long periods of time. They see some changes are irreversible, and negative feedback can stabilize a system, while positive feedback can destabilize it. They recognize systems can be designed for greater or lesser stability. |
| 9-12.HS-LS2-7.LS2.C.1 | Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. |
| 9-12.HS-LS2-6.LS2.C.1 | A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. |
| 9-12.HS-LS2-8.LS2.D.1 | Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. |
| 9-12.HS-LS4-6.LS4.C.1 | Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. |
| 9-12.HS-LS2-7.LS4.D.1 | Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). |
| 9-12.HS-LS4-6.LS4.D.1 | Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. |
| 9-12.HS-LS2-7.LS4.D.2 | Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. |
| 9-12.HS-LS4-6.ETS1.B.1 | When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and |

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| | environmental impacts. |
| 9-12.HS-LS2-7.ETS1.B.1 | When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. |
| 9-12.HS-LS4-6.ETS1.B.2 | Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. |

## Interdisciplinary Connections

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| LA.RH.9-10.2 | Determine the theme, central ideas, key information and/or perspective(s) presented in a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas. |
| MA.S-IC.A | Understand and evaluate random processes underlying statistical experiments |
| LA.WHST.11-12.2 | Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. |
| LA.WHST.11-12.5 | Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. |
| LA.WHST.11-12.7 | 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. |
| LA.WHST.11-12.8 | Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. |
| LA.WHST.11-12.9 | Draw evidence from informational texts to support analysis, reflection, and research. |

## Learning Objectives

Students who understand the concepts are able to:

• Construct an explanation based on valid and reliable evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

• Use a computational representation to illustrate the relationships among Earth systems and how these relationships are being modified due to human activity.

• Describe the boundaries of Earth systems.

• Analyze and describe the inputs and outputs of Earth systems.

• Analyze geosciences data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

• Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade-off considerations.

• Construct explanations for how the environment and biodiversity change and stay the same when affected by human activity.

• Use empirical evidence to make claims about the impacts of human activity on biodiversity.

• Design a solution for a proposed problem related to threatened or endangered species or to genetic variation of organisms for multiple species.

• Analyze costs and benefits of a solution to mitigate adverse impacts of human activity on biodiversity

**Action Verbs:** Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

| Remember | Understand | Apply | Analyze | Evaluate | Create |
|---|---|---|---|---|---|
| Choose | Classify | Choose | Categorize | Appraise | Combine |
| Describe | Defend | Dramatize | Classify | Judge | Compose |
| Define | Demonstrate | Explain | Compare | Criticize | Construct |
| Label | Distinguish | Generalize | Differentiate | Defend | Design |
| List | Explain | Judge | Distinguish | Compare | Develop |
| Locate | Express | Organize | Identify | Assess | Formulate |
| Match | Extend | Paint | Infer | Conclude | Hypothesize |
| Memorize | Give Examples | Prepare | Point out | Contrast | Invent |
| Name | Illustrate | Produce | Select | Critique | Make |
| Omit | Indicate | Select | Subdivide | Determine | Originate |
| Recite | Interrelate | Show | Survey | Grade | Organize |
| Select | Interpret | Sketch | Arrange | Justify | Plan |
| State | Infer | Solve | Breakdown | Measure | Produce |
| Count | Match | Use | Combine | Rank | Role Play |
| Draw | Paraphrase | Add | Detect | Rate | Drive |

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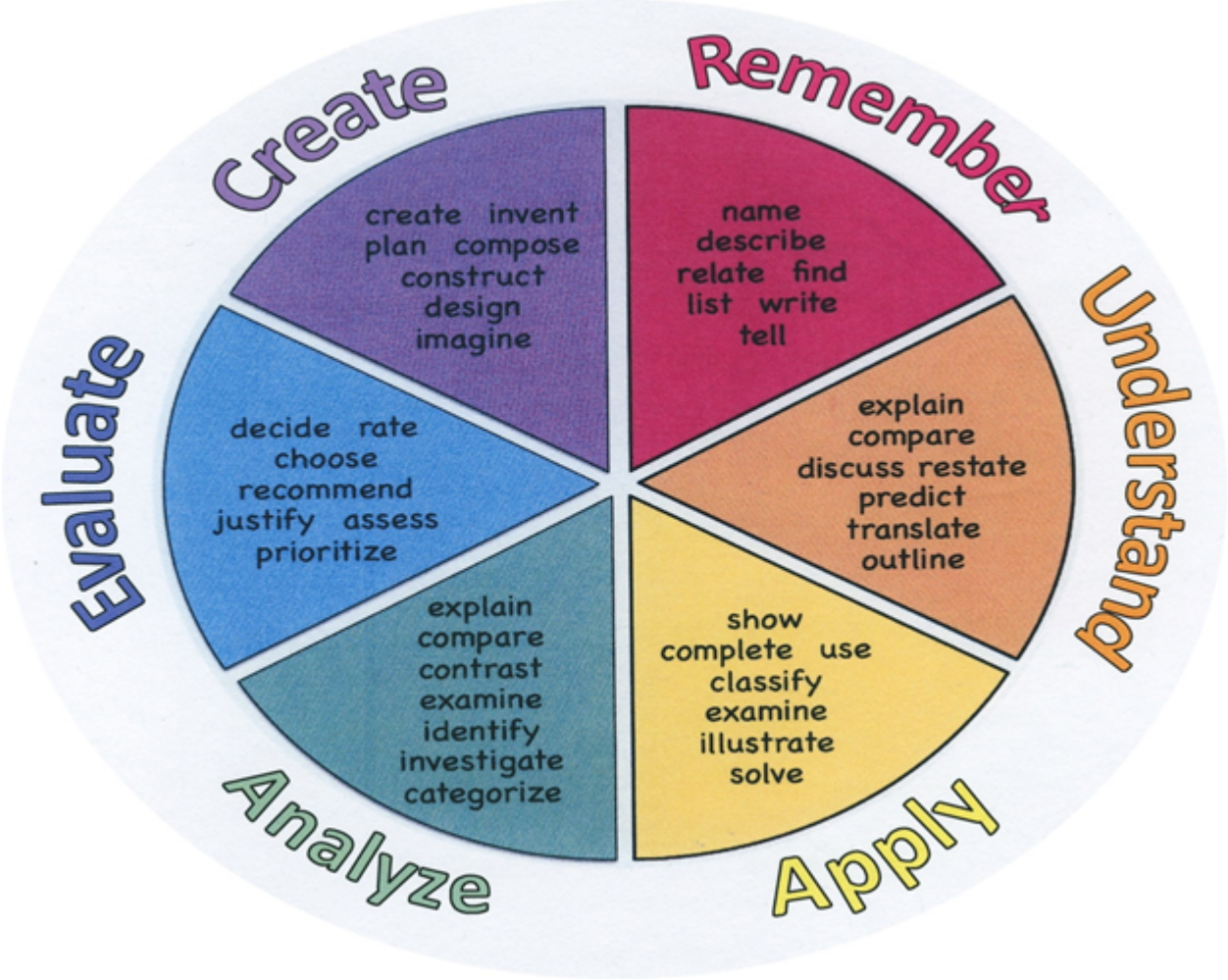
|---|---|---|---|---|---|
| Outline<br>Point<br>Quote<br>Recall<br>Recognize<br>Repeat<br>Reproduce | Represent<br>Restate<br>Rewrite<br>Select<br>Show<br>Summarize<br>Tell<br>Translate<br>Associate<br>Compute<br>Convert<br>Discuss<br>Estimate<br>Extrapolate<br>Generalize<br>Predict | Calculate<br>Change<br>Classify<br>Complete<br>Compute<br>Discover<br>Divide<br>Examine<br>Graph<br>Interpolate<br>Manipulate<br>Modify<br>Operate<br>Subtract | Diagram<br>Discriminate<br>Illustrate<br>Outline<br>Point out<br>Separate | Support<br>Test | Devise<br>Generate<br>Integrate<br>Prescribe<br>Propose<br>Reconstruct<br>Revise<br>Rewrite<br>Transform |




## Suggested Activities & Best Practices

- Claim, Evidence, Reasoning Chart (CER) creation- Impact of Human Activity on Climate/Environment

- CER Population and Effects on Environment
- Renewable Energy Research Project
- Evaluating Online Resources (For Research Projects)
- Our Climate Our Future: Video Clips
- Human Population Growth Graphing Activity
- Eutrophication Lab
- Coral Reefs and Climate Change Data Analysis
- Carrying Capacity Activities
- 100 Ways to Save the Environment Discussion

## Assessment Evidence - Checking for Understanding (CFU)

Assessments Generated using ExamView Test Generator and Test Bank from Miller/Levine Biology 2017 (Summative)

Common, Department Quarterly Benchmarks (Benchmark)

Oncourse Assessment Tools (Formative)

Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart

- Learning Center Activities
- Multimedia Reports
- Newspaper Headline
- Outline
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- Written Reports

## Primary Resources & Materials

**Prentice Hall: Biology**

Kenneth R Miller, Ph.D. - Joseph Levine, Ph.D. - New Jersey - Pearson Prentice Hall, Upper Saddle River - 2014, 2017

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Please list all district-provided Primary Resources & Materials and/or those outside that are accessed with district resources.

## Ancillary Resources

- PearsonEasyBridge.com
- Chrome Book Projects/ Research/ Analysis
- Google Classroom
- On-line Databases via Media Center

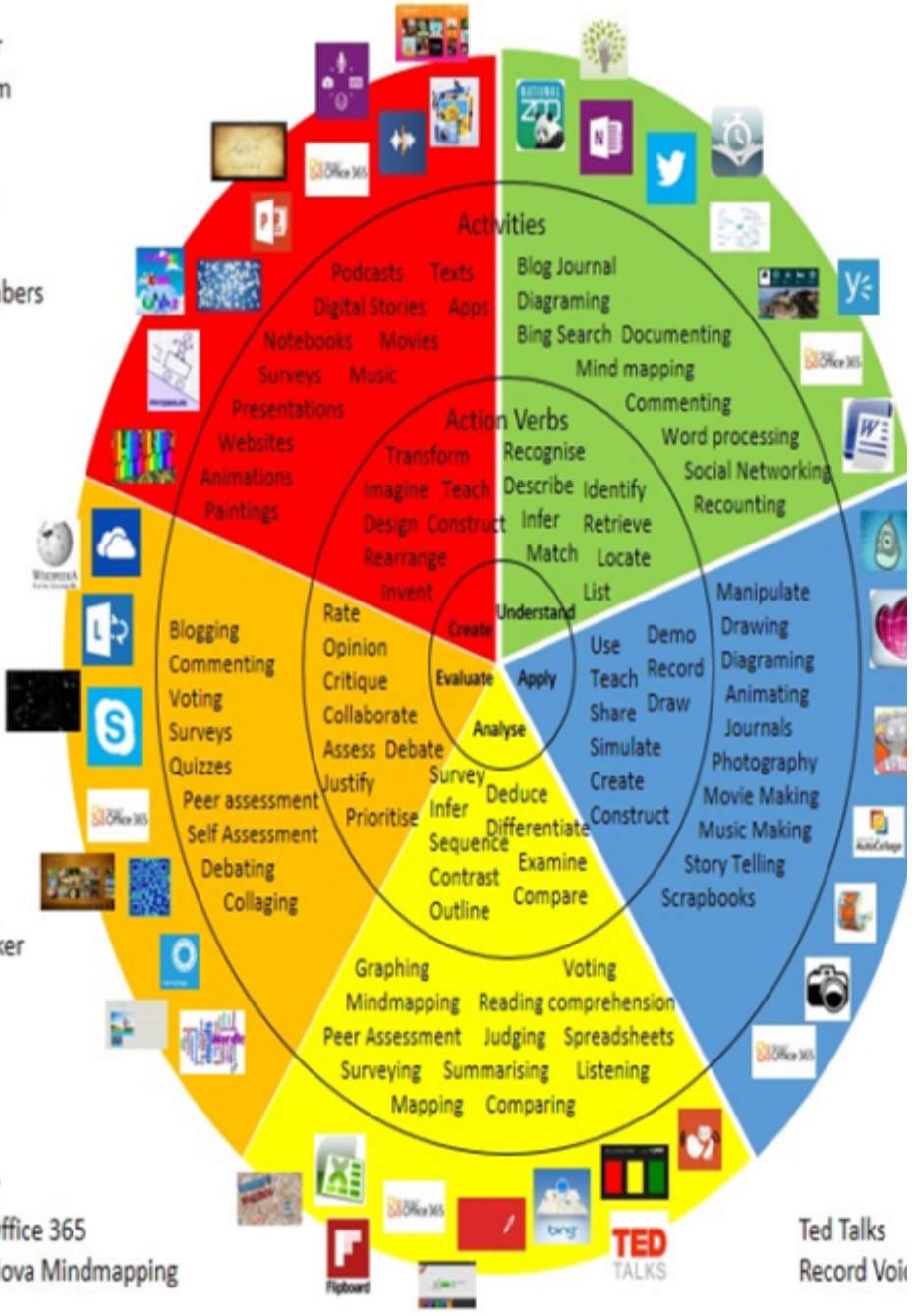
## Technology Infusion

- Research Using Online Databases for CER Chart Projects
- Utlize spreadsheet software (Excel, google sheets) for graphing data
- MS Powerpoint
- Google Drive
- Prezi
- Khan Academy
- Ted Talks
- Bozeman Science (Youtube)
- Windows Movie Maker
- Time Lapse
- Local Zoo
- Wikipedia
- Word Cloud Maker
- Memorylage

# Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker




Where's Waldo?
MS Excel
Flipboard
Office 365
Nova Mindmapping

Ted Talks
Record Voi

Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

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## Alignment to 21st Century Skills & Technology

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| CRP.K-12.CRP2 | Apply appropriate academic and technical skills. |
| CAEP.9.2.12.C.3 | Identify transferable career skills and design alternate career plans. |
| CAEP.9.2.12.C.4 | Analyze how economic conditions and societal changes influence employment trends and future education. |
| TECH.8.1.12.B | Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology. |
| TECH.8.1.12.B.CS1 | Apply existing knowledge to generate new ideas, products, or processes. |
| TECH.8.1.12.C | Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. |

## 21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

## 21st Century Skills

- Civic Literacy
- Environmental Literacy
- Global Awareness
- Health Literacy

## Differentiation

Adjust evidence requirments for CER.

Provide exemplars of appropriate data.

**Differentiations:**

- Small group instruction

- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Token economy
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Story guides
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Large print edition
- Dictation to scribe
- Small group setting

**Hi-Prep Differentiations:**

- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Literature circles
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

**Lo-Prep Differentiations**

- Choice of books or activities
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied journal prompts
- Varied supplemental materials

## Special Education Learning (IEP's & 504's)

Students are provided with written notes and digital copies of presentations, as well as hard copy and digital textbook access.

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating

- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

## English Language Learning (ELL)

Students are provided with glossary in their native language.

Spanish speaking students may utilize Spanish Edition of Textbook for in class assignments.

- teaching key aspects of a topic.  Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

## At Risk

Student provided access to digital learning tools via EasyBridge platform.

This should include virtual labs, presentations, videos, and practice questions.

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic.  Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning

- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

## Talented and Gifted Learning (T&G)

Students participate in 'Sustainable Design Project.'

Students design, execute, and report on an original hypothesis.

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a blog or social media page about their unit
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

## Sample Lesson

Sample Lesson Provided in Unit 1