Unit 3 - Integration and Coordination (Life Science)

Content Area: **Science**
Course(s): **Anatomy & Physiology**
Time Period:
Length: **14 Days - Grade 11-12**
Status: **Published**

Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

ANATOMY AND PHYSIOLOGY, GRADE 11-12

UNIT 3 - INTEGRATION AND COORDINATION

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: MR. VINCENT A. ORREI

Dr. Richard Tomko, Ph.D., M.J., Superintendent of Schools

Ms. LucyAnn Demikoff, Director of Curriculum and Instruction K-12

Ms. Nicole Shanklin, Director of Elementary Education K-8, ESL Coordinator K-12

Mr. George Droste, Director of Secondary Education

Board Approved: September 23, 2019

Unit Overview

This unit contains information about how the body accomplishes sensory input, integration, and motor output, how the special sense organs are able to collect sensory input and send it to the brain for interpretation, and how the endocrine system helps maintain homeostasis through the release of hormones. The first section will begin with an overview of the organization of the nervous system and basic terminology. The section will then focus on the microscopic aspect of the nervous system, including the structure and function of an individual neuron. Students will explore reflex arcs before exploring the nervous system on a larger scale. The system is broken into two categories, the central nervous system and the peripheral nervous system. Focusing on the central nervous system, students will investigate the structure and function of the brain and spinal cord. Students will also learn about the peripheral nervous system and its two main categories, the parasympathetic and sympathetic divisions. The section will conclude with an overview of the developmental changes of the nervous system and main diseases associated with it. The second section will then focus on each of the five senses and the structure and function of each organ responsible for them. The section will conclude with exploration of the developmental changes each sense goes through from infancy to old age. The final section focuses on the endocrine system. It is responsible for maintaining homeostasis by releasing chemicals called hormones, and it controls processes such as growth and development, reproduction, and metabolism. The section will start with an overview of the system and a chemical exploration of hormones. The section will then have students investigate the mechanisms of hormone action and how negative feedback mechanisms control the release of hormones. Next, students will investigate the anatomy and physiology of each of the major endocrine organs: the pituitary gland, the thyroid gland, the parathyroid glands, the adrenal glands, the pancreatic islets, the pineal gland, the thymus gland, and the gonads. To conclude the section and the unit, for each gland, students will investigate the effects of improper functioning of the gland on the body.

Enduring Understanding

After completing this unit, students will be able to understand the following:

- The nervous system plays a role in all other body systems.
- The structure of a neuron influences its function.
- Stimulus, including action potential, leads to a nerve impulse.
- Neuron to neuron communication is a process that is critical to the function of the nervous system.
- There are different nervous systems (autonomic and peripheral) and there are types of nerves and organs involved in each.
- The autonomic nervous system is divided into divisions and each has unique properties.
- There are five types of neuro receptors they vary by form and location based on their function.
- The neurosystem plays a specific role in each of the 5 senses and the organs involved.
- The endocrine system is made up of a few major glands each of which secretes hormones that regulate important body functions.
- Hormone secretion involves negative feedback mechanisms that regulate body functions

Essential Questions

Why is the nervous system important?

How does the CNS and the PNS work together?

How are reflex arcs different from a regular nerve transmission?

What functions are controlled by the different regions of the brain?

What diseases are associated with the nervous system?

How does the structure of each sense organ aid its function?

How are the senses of smell and taste intertwined?

How is balance accomplished?

Why is hearing loss often permanent?

Why is the endocrine system important?

How does the endocrine system control body functions?

What diseases are associated with the endocrine system?

Exit Skills

Upon completion of this unit, students should have achieved the following exit skills:

- Investigate the nervous system by:
- Listing the organs and divisions of the nervous system and describing the generalized functions of the system as a whole.
- Identifying the major types of cells in the nervous system and discussing the functions of each.
- Identifying the anatomical and functional components of a three-neuron reflex arc.
- Comparing and contrasting the propagation of a nerve impulse along a nerve fiber and across a synaptic cleft.
- Identifying the major anatomical components of the brain and spinal cord and briefly commenting on the function of each.
- Identifying and discussing the coverings and fluid spaces of the brain and spinal cord.
- Comparing and contrasting spinal and cranial nerves.
- Discussing the anatomical and functional characteristics of the two divisions of the autonomic nervous system.
-
- Examine the five senses by:
- Classifying sense organs as special or general and explaining the basic differences between the two groups.
- Discussing how a stimulus is converted into a sensation.
- Listing the major senses.
- Describing the structure of the eye and the functions of its components.
- Discussing the anatomy of the ear and its sensory function in hearing and equilibrium.
- Discussing the chemical receptors and their functions.
- Discussing the general sense organs and their functions.
-
- Investigate the endocrine system by:
- Distinguishing between endocrine and exocrine glands and defining the terms hormone and prostaglandin.
- Identifying and locating the primary endocrine glands and listing the major hormones produced by each gland.
- Describing the mechanisms of steroid and protein hormone action.
- Explaining how negative and positive feedback mechanisms regulate the secretion of endocrine hormones.
- Identifying the principal functions of each major endocrine hormone and describing the conditions that may result from hyposecretion or hypersecretion.
- Defining diabetes, insipidus, diabetes mellitus, gigantism, goiter, cretinism, and glycosuria.

New Jersey Student Learning Standards (NJSLS-S)

SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
SCI.HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
SCI.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
9-12.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
9-12.HS-LS1-2.2.1	Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-4.2.1	Use a model based on evidence to illustrate the relationships between systems or between components of a system.
9-12.HS-LS1-3.3.1	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
9-12.HS-LS1-2.4.1	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-LS1-4.4.1	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-LS1-3.7.1	Feedback (negative or positive) can stabilize or destabilize a system.
9-12.HS-LS1-2.LS1.A.1	Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
9-12.HS-LS1-3.LS1.A.1	Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

Interdisciplinary Connections

MA.S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
MA.S-ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
MA.S-IC.A	Understand and evaluate random processes underlying statistical experiments
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
LA.RST.11-12.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.11-12.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
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.11-12.6	Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.
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.
HPE.2.1.12.A.1	Analyze the role of personal responsibility in maintaining and enhancing personal, family, community, and global wellness.
HPE.2.1.12.A.2	Debate the social and ethical implications of the availability and use of technology and medical advances to support wellness.
HPE.2.1.12.A.CS1	Developing and maintaining wellness requires ongoing evaluation of factors impacting health and modifying lifestyle behaviors accordingly.
HPE.2.1.12.B.3	Analyze the unique contributions of each nutrient class (fats, carbohydrates, protein, water, vitamins, and minerals) to one’s health.
HPE.2.1.12.C.1	Determine diseases and health conditions that may occur during one’s lifespan and identify prevention and treatment strategies.
HPE.2.1.12.C.CS1	Personal health is impacted by family, community, national, and international efforts to prevent and control diseases and health conditions.
HPE.2.1.12.D.1	Determine the causes and outcomes of intentional and unintentional injuries in adolescents and young adults and propose prevention strategies.
HPE.2.1.12.D.6	Demonstrate first-aid procedures, including Basic Life Support and automatic external defibrillation, caring for head trauma, bone and joint emergencies, caring for cold and heat injuries, and responding to medical emergencies.
HPE.2.1.12.E.1	Predict the short- and long-term consequences of unresolved conflicts.
HPE.2.1.12.E.CS1	Respect and acceptance for individuals regardless of gender, sexual orientation, disability, ethnicity, socioeconomic background, religion, and/or culture provide a foundation for the prevention and resolution of conflict.
SOC.9-12.1.2.1	Construct various forms of geographic representations to show the spatial patterns of physical and human phenomena.

SOC.9-12.1.4.2	Demonstrate effective presentation skills by presenting information in a clear, concise, and well-organized manner taking into consider appropriate use of language for task and audience.
9-12.HS-PS2-6	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.
9-12.HS-PS2-6.8.1	Communicate scientific and technical information (e.g. about 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-PS2-6.PS1.A.1	The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.
9-12.HS-PS2-6.PS2.B.1	Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.

Learning Objectives

Explain the structural and functional classifications of the nervous system.

Differentiate between the central nervous system and peripheral nervous system in terms of function and location.

Compare and contrast the structure and function of neurons and neuroglia.

Describe the general structure of a neuron and explain its two main functions.

Compare and contrast gray versus white matter.

Identify the different categories of sensory receptors and describe their function.

Describe the events that lead to the generation of a nerve impulse and its conduction from one neuron to another.

Explain a reflex arc.

Identify and indicate the functions of the major regions of the cerebral hemispheres, diencephalon, brain stem, and cerebellum on a human brain model or diagram.

Name and discuss the function of the three meningeal layers.

Discuss the formation and function of the cerebrospinal fluid and the blood-brain barrier.

Compare the signs of a CVA with those of Alzheimer’s disease, those of a contusion, and those of a concussion.

Explain the structure and two main functions of the spinal cord.

Describe the main diseases that can affect the nervous system at each stage of life.

Identify and describe the functions of the different accessory eye structures.

Identify and indicate the function of the three eye tunics.

Compare and contrast rod and cone cell function.

Describe how image formation occurs on the retina.

Trace the pathway of light through the eye and explain how it results in vision, discussing the optic nerve and occipital lobe.

Explain the different forms of lens malformations and eye diseases that can affect vision such as: astigmatism, blind

spot, cataract, emmetropia, glaucoma, hyperopia, myopia, and refraction.

Discuss the importance of pupillary and convergence reflexes.

Identify and describe the function of the different external, middle, and internal ear structures.

Describe how equilibrium organs help to maintain balance.

Explain how the different structures of the ear work together to facilitate hearing.

Explain the difference between sensorineural deafness and conductive deafness and give examples of each.

Describe the location, structure, and function of the olfactory and taste receptors.

Identify the four basic taste sensations and explain what factors they detect and how the sense of taste can be modified by other factors.

Describe how disease and aging can affect the special sense organs.

Explain the purpose of hormones and how they bring about their effects in the body by working on target organs.

Explain the various endocrine glands functions and how they are stimulated to release their hormonal products.

Define negative feedback and describe its role in regulating blood levels of most hormones.

Compare and contrast endocrine and exocrine organs.

Identify and describe the main function of the different endocrine organs.

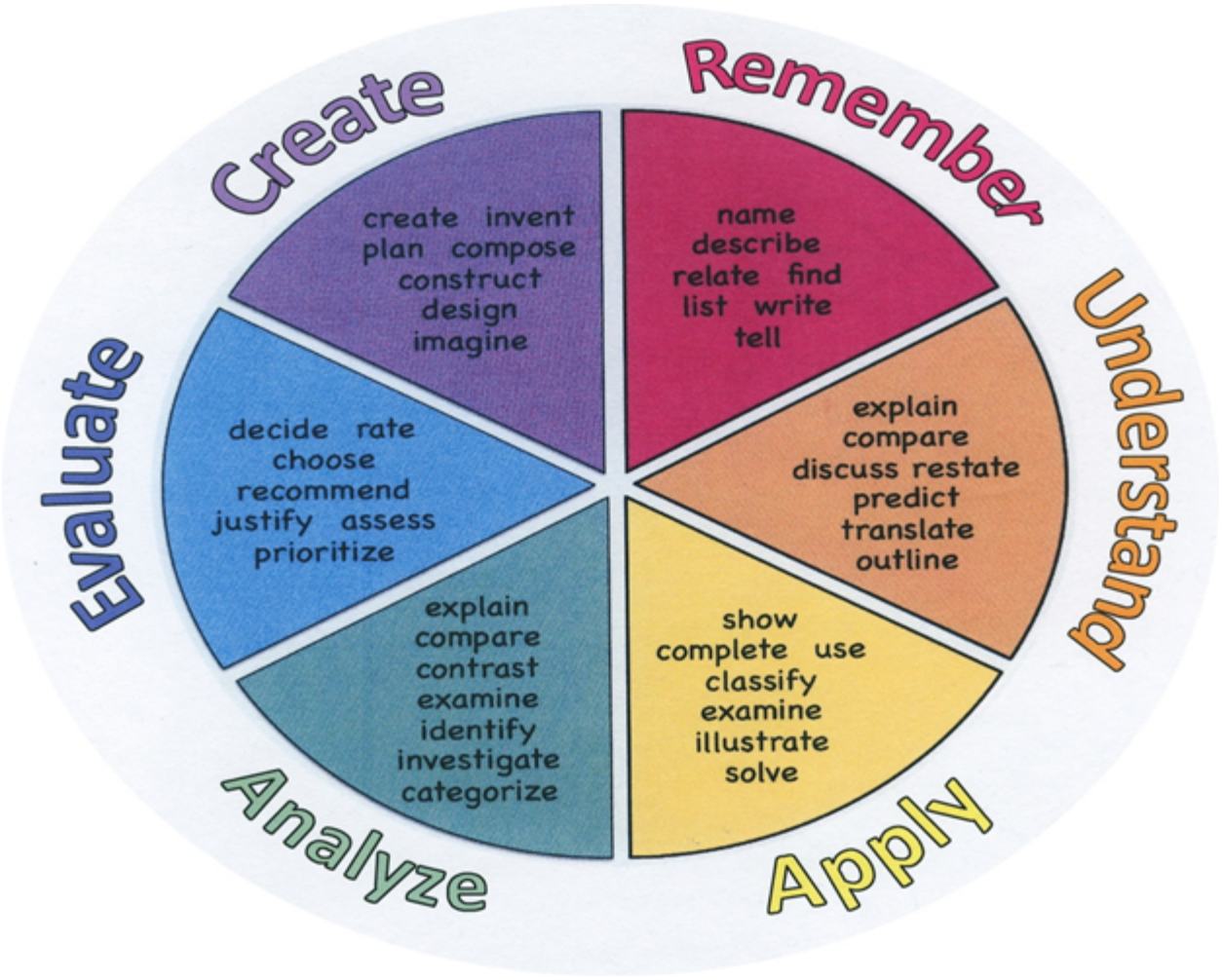
Discuss ways in which hormones promote body homeostasis by giving examples.

Explain the consequences of hypersecretion and hyposecretion of the main hormones in the body.

Describe the endocrine role of the kidneys, stomach, intestine, heart, and placenta.

Explain the effects of disease and aging on the endocrine system.

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



Suggested Activities & Best Practices

- Neuron structure and function worksheet-identify the parts of a neuron and identify the stages of a nerve impulse
- Brain structure and function worksheet-identify the regions of the brain and identify their functions
- Crash Course videos on the nervous and endocrine systems with questions
- Neuron lab-microscopic analysis of cortex and human nerve slides, making models of neurons with craft materials
- Sheep brain dissection
- Webquest on the different lobes of the brain
- Reflexes and reactions lab-check reflexes in partners (patellar, Jendrassik's maneuver, pupillary, etc.) and reaction time (reaction time ruler)
- Diseases of the nervous system lab-case studies presented for identification, testing, and treatment
- Diseases and CNS testing quiz
- Article on the effects of concussions
- Sense model project-construct a model of the eye or ear with proper labels
- Eye structure and function worksheet
- Ear structure and function worksheet
- Understanding the human senses lab
- Testing your vision and balance lab
- Sheep eye dissection
- Taste and smell structure and function worksheet

- Endocrine system structure and function worksheet packet
- Endocrine disease diagnosis activity-students presented with case studies to diagnose
- Endocrine gland project-make a PowerPoint presentation to teach the structure, function, and diseases of the gland
- Endocrine system quiz
- Unit test

Assessment Evidence - Checking for Understanding (CFU)

Google Classroom Assignment (Formative)

QUIA Quiz (Summative)

Pear Deck (Alternate)

Lab Reports (Alternate)

Common, Department Quarterly Benchmarks (Benchmark)

Oncourse Assessment Tools (Formative)

Unit Test/Quiz (Summative)

"Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Blank diagrams
- Compare & Contrast
- Crash Course Video Questions
- Define
- Describe
- Diagram Quizzes
- Evaluate
- Evaluation rubrics
- Exit Tickets

- Explaining
- Illustration
- Journals
- KWL Chart
- Lab- Human Senses
- Lab- Nerve Conduction
- Learning Center Activities
- Multimedia Reports
- Outline
- Project- Hormonal Feedback Loops
- Quarterly Benchmarks
- Self- assessments
- Study Guide
- Teacher Observation Checklist
- Unit review/Test prep
- Unit tests
- Web Quests
- Web-Based Assessments

Primary Resources & Materials

Textbook: *Biology*, Miller and Levine

Chromebook: Online access to textbook and digital resources from *Biology,* Miller and Levine

Ancillary Resources

YouTube videos - Crash Course/Anatomy and Physiology series with associated question worksheets

Human torso models

Diagram packages

Compound light microscopes

Selection of prepared slides showing properties of tissue types

Nerve Pathways Lab Kit

Human Senses Lab Kit

Sheep brains for dissection

Sheep eyes for dissection

Full-scale skeleton model

Technology Infusion

Student-issued Chromebooks

Interactive digital content available through Pearson EasyBridge

YouTube videos for lesson enhancement and differentiation

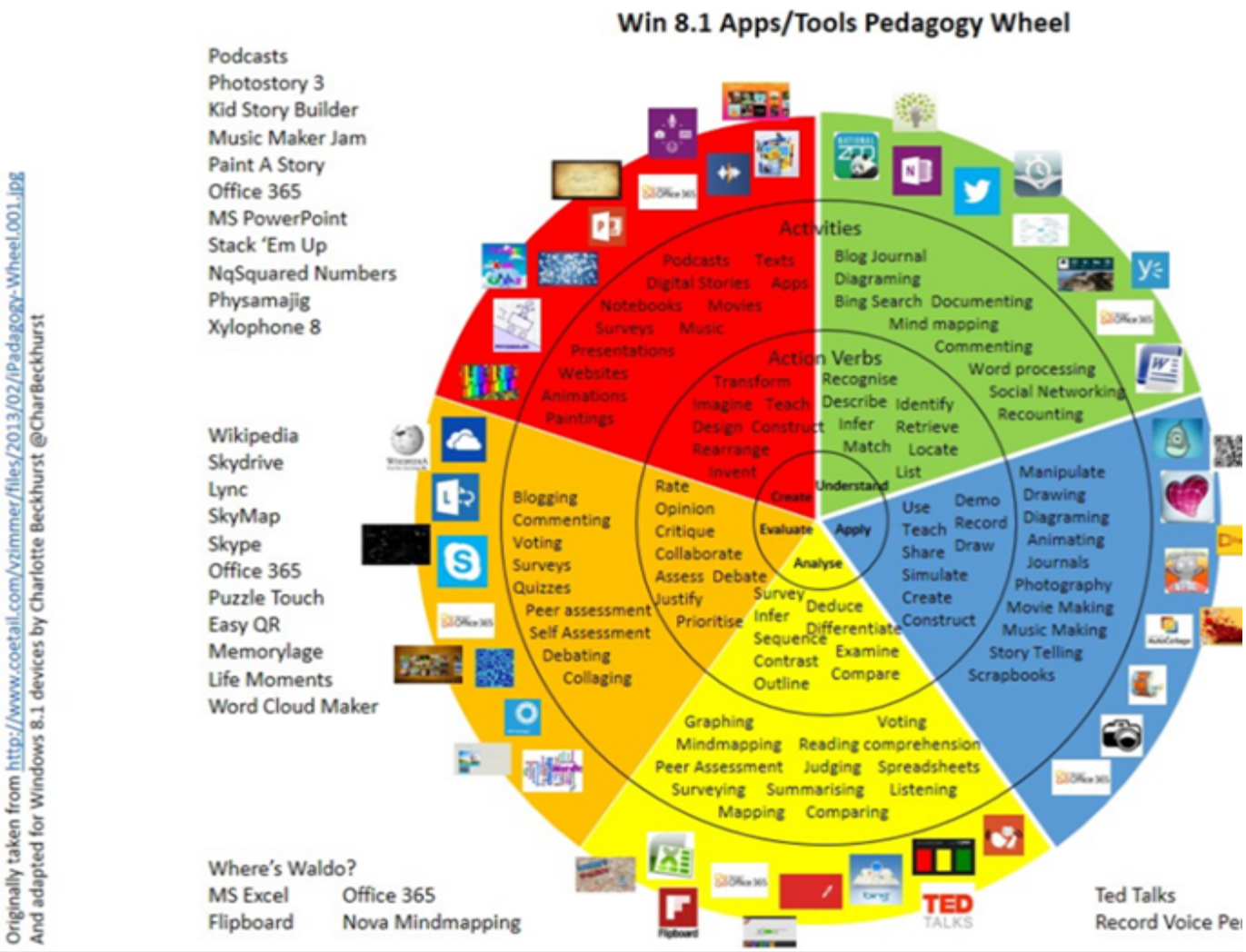
Google Classroom

Google Suite

Prezi

Subscription to Defined STEM website

Use MS Word, Excel, PowerPoint, OneNote



Smart TV

WIreless HDMI

Multimedia projector

Alignment to 21st Century Skills & Technology

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP3.1	Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the

	nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.7	Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.

TECH.8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

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

- Financial, Economic, Business and Entrepreneurial Literacy
- Health Literacy

Differentiation

Unit-specific exemplars:

1) Manipulatives will be used to help understand regions of the human brain.

2) Problem-based learning is exemplified by emplyimg case studies in nervous system pathologies.

3) Exploration by interest will be employed when setting up groups for Human Senses lab activity.

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Study guides
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Leveled rubrics
- Multiple intelligence options
- Multiple texts
- Project-based learning
- Problem-based learning
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Varied supplemental materials

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

Unit-specific exemplars:

1) Preview of content, concepts and vocabulary will be used by assigning online modules from Miller/Levine Biology Online.

2) Lab question will be shortened and streamlined for ease of completion.

3) Unit test will be shortened and with fewer choices of answers.

- printed copy of board work/notes provided
- additional time for skill mastery
- behavior management plan
- 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)

Unit-specific exemplars:

1) Bilingual textbooks will be assigned for improved understanding of content.

2) ELL students will be paired with flent bilingual students to provide tutoring and assistance during class.

3) Unit tests will be worded in simple terms, will be offered as open-book, and may be completed with assistance from ELL faculty.

- 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

Unit-specific exemplars:

1) Alternative videos (Crash Couse) may be assigned to support student understanding of topics with visual assitance.

2) Alternative summative assesments will be offered to demonstrate knowledge of unit material.

3) Written tests may be performed open-book or with notes to assist in success.

- 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)

Unit-specific exemplars:

1) Brain dissection will be offered after school for students interested in further investigation.

2) Additional research may be performed to link historical events or other multi-disciplinary information to increase the depth of knowledge.

3) Additional research into rain and coordination disorders will be offered to students wishing to increase knowledge in nervous system pathologies..

- 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
- 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