SC DEPARTMENT OF EDUCATION

Bundling Guide for Anatomy and Physiology

Office of Assessment and Standards

Purpose and Use

This document is intended to be a guide to provide examples of ways Performance Expectations (PEs) could be bundled. For this purpose, a bundle as defined by Pruit (2014), is, "a set of PEs that provide students with coherent connections among concepts within and across disciplines." This document is not intended to be read from cover to cover, but to be used, when needed, to support teacher professional learning and curriculum decisions. This is not intended for student use, and thus is not written in student-friendly language. This is not a curriculum or a means to limit instruction in the classroom. The bundles presented in this guide are not ordered for instruction. Although each PE states a dedicated Science and Engineering Practice (SEP) and Crosscutting Concept (CCC), students will need to use the whole range of SEPs and CCCs to achieve success by the end of instruction.

The bundles in this document do not represent the only way the PEs can be bundled. PEs bundled together may change depending upon the selected anchoring phenomenon that students are working to explain. The bundles presented in this guide were developed using an iterative process informed by the work of Krajick and colleagues (2014). This process is summarized in the steps below:

1. Review bundles that already exist.
2. Build bundles around an anchoring phenomenon.
    a. The "Example anchoring phenomena to support 3D instruction" provided in this resource is just that, an example. There are myriad phenomena to support 3D instruction, and different phenomena may be more appropriate for different learning contexts.
3. Explore and look for unexpected relationships among the PEs, including bundling across disciplines (Earth and Space Science, Life Science, Physical Science) when appropriate. This can include identification of PEs that are only partially met in the bundle.
    a. PEs within a bundle marked with an asterisk (*) share an authentic connection with the bundle but may not fully met.
    b. PEs from additional high school content areas with a close connection to the bundle are listed. This is not intended to add to the instructional demand, but instead to provide teachers with additional content to build upon and/or support student sensemaking.
4. Make sure each PE in the grade/course is found in at least one bundle.

Structures and Functions of Living Systems

In multicellular organisms, different systems are structured hierarchically, with each system comprising numerous parts and itself being a component of a larger system. Feedback mechanisms are essential for maintaining the internal conditions of a living organism within certain limits, allowing it to function properly despite changes in external conditions. These feedback mechanisms can either encourage (positive feedback) or discourage (negative feedback) activities within the organism, depending on the situation.

PEs aligned to this bundle:

- B-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- B-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Connected PEs from additional content areas:

- B-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
- B-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and other large carbon-based molecules necessary for essential life processes.
- B-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
- C-PS1-3. Plan and conduct an investigation to gather evidence to compare the structure of substances at a bulk scale to infer the strength of various forces between particles.
- C-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
- C-PS4-4. Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.
- C-PS4-5. Communicate technical information about how some technological devices use the principles of the electromagnetic spectrum to cause matter to transmit and capture information and energy.

Example anchoring phenomena to support 3D instruction:

- Structures and functions of various body systems (for example: generation of a nerve signal, muscle contraction and relaxation, digestion, etc.)
- Homeostatic disruptions of various body systems

References

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