**The Power of Exercise**

**Subject area/course**: Science, Introduction to Human Anatomy and Physiology

**Grade level/band**: 11–12

**INSTRUCTOR PROCEDURES**

1. **Task overview**:

Assuming the role of a potential personal trainer, students write a research paper describing the various aspects of a typical skeletal muscle fiber (cell). In the paper, students include information on the basic anatomy of a muscle fiber, the sliding filament theory, and the roles of both ATP and calcium ions in muscle contraction. Information on the activities of other body systems in providing resources for muscle contraction should also be included. In the paper, students pick a common exercise and indicate which specific muscles are involved and explain how repeated exercise affects the structure and function of those muscles. Issues of system interdependence and how changes in the muscles might impact the function of other body systems should also be included.

1. **Prior knowledge required:**

Students should be able to:

* Understand the basic structure and function of a typical skeletal muscle fiber.
* Understand the dynamic nature of muscle tissue.
* Understand the concept of interdependence between body systems.
* Use CSE style or another format of your choice.
* Gather information and compose an explanatory work within a topic area.
* Analyze information to formulate conclusions.
1. **Common Core State Standards aligned to this task**:

[CCSS.ELA-Literacy.WHST.11-12.4](http://www.corestandards.org/ELA-Literacy/WHST/11-12/4/) Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

[CCSS.ELA-Literacy.WHST.11-12.5](http://www.corestandards.org/ELA-Literacy/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.

[CCSS.ELA-Literacy.WHST.11-12.8](http://www.corestandards.org/ELA-Literacy/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.

[CCSS.ELA-Literacy.RST.11-12.1](http://www.corestandards.org/ELA-Literacy/RST/11-12/1/) Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

[CCSS.ELA-Literacy.RST.11-12.2](http://www.corestandards.org/ELA-Literacy/RST/11-12/2/) Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

[CCSS.ELA-Literacy.RST.11-12.7](http://www.corestandards.org/ELA-Literacy/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.

[CCSS.ELA-Literacy.RST.11-12.9](http://www.corestandards.org/ELA-Literacy/RST/11-12/9/) Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

**Next Generational Science Standards (NGSS)**

From Molecules to Organisms: Structures and Processes:

**LS1.A: Structure and Function**

* Systems of specialized cells within organisms help them perform the essential functions of life.
* 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.
* 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 (through negative feedback) what is going on inside the living system.
1. **Time requirements:**

After the class has completed the instructional unit on the muscular system, students should be allowed approximately two weeks outside of class to complete the assignment. It will be helpful to emphasize the idea of interdependence of body systems during your coverage of the muscular system.

1. **Instructor materials to use during administration:**
* Current Human Anatomy and Physiology textbook
* Google Scholar
* Examples of citing works using CSE style: <http://www.pc.maricopa.edu/departments/library/guides/cse_examples.pdf>
1. **Instructor procedures during administration:**
* Students should work independently throughout the task.
* Many students may not know how to perform a search of academic sources, including journals. Therefore, you may want to dedicate some class time to providing a tutorial.
* As this type of research project may be daunting for some students, it would be valuable to have them submit a rough draft in order for you to provide feedback on their progress.
* Assess the student’s rough draft and provide feedback regarding content and writing style.
* Students should produce a paper with clear and coherent writing.
* Make a point to review, and correct if needed, the student’s use of proper grammar and syntax.
* The paper should display organization and be written in a style appropriate to the task, purpose, and audience.
1. **Student support:**

The following suggestions are examples of scaffolding that can be used to meet the diverse student needs within the classroom.

* Provide class time for research on students’ topics.
* Provide definitions to vocabulary ahead of time.
* For the final product, all learners will benefit from peer assistance while brainstorming their topics, as well as a peer or teacher edit of their papers before final submission.
* Some students will have good research skills, but some will need guidance in the determination of appropriate sources and where to look for them. It is important to spend class time in review of what constitutes an appropriate source in advance of students’ independent work time.
1. **Extensions or variations:**
* Students could present the results of their research to the class via an oral or multi-‐media presentation.
* If there is a particularly interesting and/or controversial topic, a debate could be organized where students choose sides on the topic and defend their views.
1. **Scoring and assessment considerations:**

EPIC developed the *College and Career Ready (CCR) Task Bank Scoring Rubric* to accompany this task. If your school or department uses a standardized rubric that would fit the content and requirements of this task, you may choose to use your existing rubric. The following notes and suggestions are meant to clarify the intent of the rubric and include considerations for the assessment of student work.

* When assigning the task, provide students with the rubric that will be used to score their final product and discuss it as a class.
* Unlike some rubrics, the *CCR Task Bank Rubric* does not predetermine “point values” for the scoring criteria. The rubric thus allows for flexibility with different instructors’ scoring systems and individual determination of the “weight” of each criterion.
* Student work that scores at the *Accomplished* level is considered to be entry-level college work.
* The *Exceeds* category on the rubric provides an example of how a student can go above and beyond the *Accomplished* level. These examples are intended to be only ONE way a work product can exceed expectations, thus allowing room for your professional judgment.
* If needed, consider including task-specific criteria as an additional scoring category to the rubric or providing a checklist of requirements for the task.