

Various Forms of Literacy Instruction in Anatomy

within the Special Topics Project

Amanda A. McCristal

Michigan State University

Abstract

Studies have shown that students are more prepared for college level coursework when their literacy skills have been spread across various content areas. With ample practice, students' organization, summarization, and analysis skills are significantly improved, they produce richer understandings, and they become more able to use writing to communicate their learning and thinking (Writing Across the Curriculum, p. 2). By giving students the opportunity to practice reading and writing through instruction within anatomy lessons, students have more exposure to critical reading and writing skills that will aid them in their future pathways. Within my fifth and sixth grade physical education classes, we reviewed the anatomy of the human skeleton while using reading and writing strategies to aid the process. Students were engaged and motivated through various activities such as carousel brainstorming, consistent checking for understanding, grasping fascinating lessons, and finally synthesizing and applying information to determine student understanding.

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Lesson Plan: Introduction to Anatomy, Major Bones and Muscles

Rationale: Students are lacking the basic reading and writing knowledge that must span across various content areas. In order to improve students' reading comprehension and writing, I have designed a lesson to include basic anatomy that my classes have already been reviewing with reading and writing strategies.

Common Core Standards: Reading Comprehension, R.IT.06-08.04: respond to individual and multiple texts by finding evidence, discussing, illustrating, and/or writing to reflect, make connections, take a position, and/or show understanding. **Writing, R.WS.06-08.07:** in context, determine the meaning of words and phrases including 6 – regional idioms, literary and technical terms, and content vocabulary using strategies including connotation, denotation, and authentic content-related resources.

Objectives and Outcomes: Students will be able to identify the major bones and muscles of the body in relation to their current origins and insertions and be able to explore new muscles and activities to target muscle and bone growth.

Many students are lacking skills in proper writing mechanics and reading comprehension. In order to identify with students' interests and motivation, I created a lesson revolving around the human skeleton and why our bodies are so important for everyday use. After assessing students on a quick spelling check in a previous lesson, many students did not know the proper location nor spelling for major bones of the body including the clavicle, ribs, vertebrae, and femur. In order to help students develop basic knowledge of the location of major bones, their spelling, and function, I developed a lesson to allow student growth in this area.

Grasping a student's attention from the moment they enter the door is an important step to providing an effective lesson. When students entered the gym, I was wearing a back brace that I had to wear when I broke my L4-L5 vertebrae in a college gymnastics class. Students were shocked, and asked all sorts of questions as to what happened. I told the story of how my compression fracture occurred, and exactly where on the body the lumbar vertebrae were

located. I saw the amazement in my students' eyes and from that moment, they were hooked. I explained during our topic of the week session that we would be reviewing the human skeleton in a new and memorable way. Through reading, writing, and moving, students were excited to participate in the lesson and eager to partake in a new learning experience they had not ever experienced in their core science curriculum.

Students' critical thinking skills and understanding must always be challenged. Therefore, instead of jumping right in and directing the instruction of the lesson, I asked the students to look around and think about what we might be doing with the skeletons I had posted around the gym (six large skeleton cut outs, per a group of four students). I also had various bones and muscles listed on the white board and pictures of these bones and muscles scattered around the gym. Since science learning is usually visual, readers need to move back and forth between visual information and prose passages (Buehl, 2011, p.56). Furthermore, since most biology and anatomy elements of science do not only rely on language, but diagrams as well, students must infer how visuals might be described in written language (Buehl, 2011, p. 56). Therefore, in order to grasp students' reading and writing understanding, I used many visuals and a matching game to start with the first portion of the lesson. In addition to the matching game was a report on one specific highlighted muscle at each station that had to be described in detail with its function, location, and activities that can be performed to strengthen the particular muscle.

The steps throughout the lesson included a quick review of the topic of the week, (the skeletal system), why the bones and muscles are important to everyday living, (support, protection, movement, blood cell production, and mineral storage), review of the matching game within groups of four, sharing the outcomes, and finally a report from each student. This report

was formulated with the strategy “Save the Last Word for Me” in mind. When students are able to leave a class with their voice being heard through activities that stimulate personal reflection, they are more eager to participate the next time (Buehl, 2009, p. 151). Students are encouraged to share during group discussions and talk about things they personally connect to (Buehl, 2009, p. 152). The last activity focus on one main muscle of the body, its function, location, and movement that can increase its strength, and a personal reflection of a personal injury or worst injury one could acquire. During the free write, many students were anxiously waiting to share their stories and wanted to discuss implications of various injuries to the skeletal system.

Throughout this lesson, differentiated instruction was utilized for various learner types. I had a few students that were kinesthetic and visual learners who really needed to feel and see the main concepts of the lesson. Within the anatomy review, I was able to find a real skeleton from the science teacher, and work one on one with a few students allowing them to feel and see exactly where the major bones of the body were located. Although this caused a bit of debate with other students wanting to join in, I was able to identify with my kinesthetic learners on an individual basis, and make sure they also felt connected during the lesson. Furthermore, in the background of the gym I was able to pull down a large projection screen and use a scrolling power point to project pictures of exercises that worked various muscles of the body. By utilizing almost all of the senses throughout this lesson, and incorporating technology, students were motivated to participate in the matching game and individual report.

Images on Scrolling PowerPoint:



Triceps push up

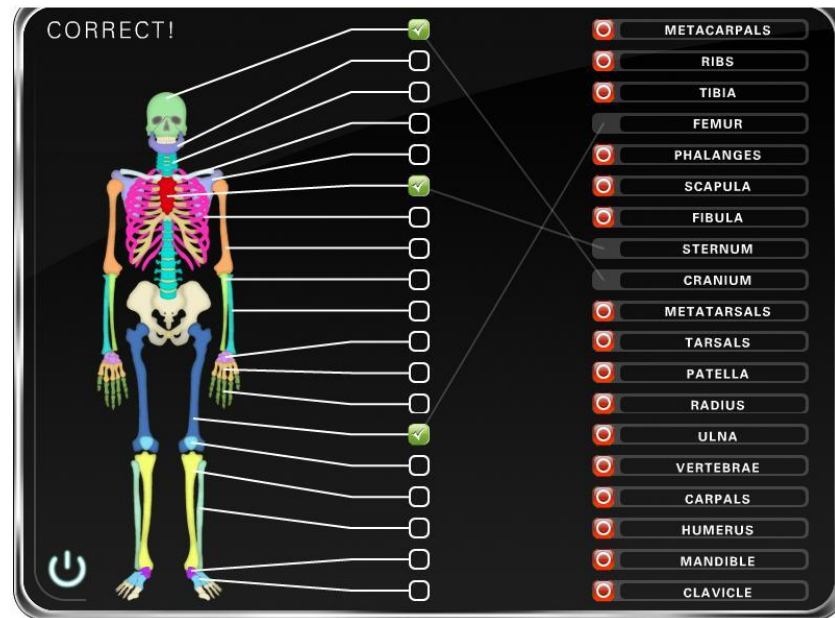


Calf raises



Triceps drop

Skeletal Matching Game: This version was cut out and pasted at six stations throughout the gymnasium. The students had to glue each bone label to the line pointing to the skeleton.



Students were very eager and excited to participate in the bone match game. Since students are likely to bring some topic knowledge of the physical and biological world, I assumed that there was some prior knowledge brought into the lesson (Buehl, 2011, p.98). Few students had difficulty pronouncing the various bones, but since reviewing the skeletal system the previous two months, many could identify with at least the prefix of the word and were able to determine an approximate location. I noticed many students were mixing up the location of the carpals and metacarpals and tibia and fibula. These bones will be reviewed further as we continue into the remainder of the school year. Although almost all of my children succeeded in the matching game, some students with special needs needed a little bit more time. In consideration of their needs, I was able to adjust the time for some students, and had additional resources for a few of my gifted learners. I had additional bones that they could try to match

while the rest of the class was finishing with their assignment (cervical, thoracic, and lumbar zones of the vertebrae, the listing of the ribs numbers in order, and a few extra muscles, sternocleidomastoid, pectoralis major and minor, and the three portions of the deltoid muscle, anterior, medial, and posterior).

In order for students to internalize the material throughout this lesson, there had to be previous knowledge. For two months prior to this lesson, we had been reviewing the major bones of the body listed on the skeletal matching game. When teaching science, many educators utilize the teaching through telling method (Buehl, 2011, p.100). Instead of a call to text-centric science, many teachers turn to one of two ways of teaching; teacher presentations which substitutes telling for reading, or hands on science, which I tried to implement more into this lesson (Buehl, 2011, p.100). We also incorporated a new muscle of the week to aid the students' knowledge of major muscles and their functions. However, by only seeing the students once a week, there were only so many muscles we could review. Therefore, this lesson also had an exploration piece involved, including looking at various muscle diagrams and determining, sometimes by its shape, where it might go. Many students were eager to at least try to see where each muscle fit on the skeleton, and then we reviewed the correct responses.

By the end of the lesson, students should have been able to identify the major bones of the body and place them specifically in their right locations. Additionally, students had to report on the function, location, and exercises to strengthen particular major muscles of the body and turn in this report. They should be able to analyze various movements that attribute to muscle growth depending on the exercise (ex. bicep curl strengthens the biceps, squats strengthen the quadriceps, overhead press strengthens the latissimus dorsi, etc.) Throughout this assignment, students are expected to use proper spelling and grammar structure, and formulate their answers

through an organized response. Students will be using the vocabulary terms from the bones that are already listed on their bone match assignment; therefore, since the spelling is already given, they must practice rewriting the bones with correct spelling. Within their major muscle assignment, students must also comment on the insertion of the closest bone, and discuss whether the muscle is located on the anterior or posterior side of the body.

By continually applying information to real life situations (like wearing my back brace to prove a point of how vital ones vertebrae is to the body) students are more captivated and interested in the sciences. As one of the last questions on the muscles assignment, I had the students partake in a free write activity. During this activity, each student had to answer the question of the one bone or muscle they have ever injured or what muscle or bone would be the worst to injure if they have never had an applicable injury. By asking the students to free write on a personal question, I was reaffirming an application level to real life situations and had them thinking on the highest end of Bloom's Taxonomy that involves application and synthesis types of questions. Students were assessed on their full response to each set of questions on their major muscles assignment, their thoughtfulness and application of the major muscle assessed, and their spelling of the major bones of the human skeleton.

Throughout this lesson, students were monitoring their own progress within the bone match game and then their personal bone and muscle assignment. They were helping one another with spell checks and listing the bones in order from most superior to most inferior. Many students were learning the distinct difference between the location of the radius and ulna, and tibia and fibula. I was able to measure the objective by reviewing their answers in the skeletal and muscular system assignment. Many students were very thorough with their responses using proper grammar and organization, and others rushed through the assignment

without spell checking the vocabulary that was already given. I was able to see noticeable improvement in students' handwriting and their overall interest in the assignment from the very moment they saw my large turtle shell looking back brace. Through their writing, I was impressed with the creativity that many students demonstrated within the personal free write question at the end of the assignment. Many students had some very good points as to why breaking the femur or the cranium would be a more severe injury. Furthermore, many students reported the cranium, vertebrae, and femur within their responses.

Physical Education
Bone and Muscle Assignment

Name: _____

Date: _____

Hour: _____

1. Please list the major bones from the bone match game in order from the most superior (↑) to the most inferior (↓): *Correct spelling counts.*

| | |
|----------|----------|
| a. _____ | k. _____ |
| b. _____ | l. _____ |
| c. _____ | m. _____ |
| d. _____ | n. _____ |
| e. _____ | o. _____ |
| f. _____ | p. _____ |
| g. _____ | q. _____ |
| h. _____ | r. _____ |
| i. _____ | s. _____ |
| j. _____ | |

2. Major Muscle (from your station): _____

3. (a.) Please write in complete sentences the location and function of the muscle given. (b.) Make sure to report whether the muscle is on the anterior or posterior side of the body. (c.) Please comment about the closest bone insertion of the muscle. (d.) Please write about three exercises that can be performed to strengthen your major muscle.

4. Was there ever a time that you broke a major bone or injured a major muscle? If not, what do you think would be the worst bone or muscle to injure and why? Make sure to give three solid reasons as to why this was a horrible injury for you or why you think a specific muscle or bone would be the worst to injure.

Coinciding with the skeletal system review was an extra assignment that the students had to perform at home. I asked each student to try the bone match game at home with their parents and see if their parents could do as well as we practiced in class (http://fitness.il-projects.com/projectfit/bones/bone_match.html). This assignment not only reinforced our anatomy review at school, but also challenged the parents to get involved and have more of an awareness of their own skeletal systems. For future lessons, I plan to include a nutrition unit which requires parent involvement as well. Students would need to report on their nutritional intake along with a log of their weekly physical activity reports. Parents would also have to sign off on these logs and write down one healthy food choice they made within the previous week as well.

Throughout the anatomy lesson, I saw many sparks of interest and excitement within each set of assignments. Students were eager to share their answers from the bone match game, and assisted one another with their spelling and ideas about bone and muscle injuries. By utilizing reading and writing techniques throughout this lesson, students were able to practice their writing skills and formulate ideas, using reasoning to developing a main argument, all while incorporating the sciences, a very different content than they normally write about. More importantly, many students wanted to share to the class their own stories of previous injuries they had acquired, as well as their parents and relative. This led to a detailed conversation about bone health, the importance of calcium, physical activity, and proper nutritional diets throughout one's lifespan. By incorporating reading and writing throughout the anatomy lesson, I was thrilled to witness student engagement, peer encouragement, and group discussion based around sciences, a content that is scarcely taught coinciding with English expectations.

References

Bone Match Game. http://fitness.il-projects.com/projectfit/bones/bone_match.html

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