It's in the Numbers

Quantitative Measures

In this lesson, students read several versions of the same article. ARTICLE A contains few quantitative measures (numbers), ARTICLE B offers a range of choices for reasonable quantitative measures, and ARTICLE C is the original article as published.

"Quantitative measures are given in correct and comparable units. Nearly every story has a number—a percentage, cost, patients tested, etc. It is an important element of science practice."

SciJourn Standards for Scientific Literacy

Objective: Students will recognize the importance of quantitative measures (numbers) in articles to enhance credibility and understanding.

Materials: ARTICLE A *Creatine: Safe for Teen Athletes?*
ARTICLE B *Creatine: Safe for Teen Athletes?*
ARTICLE C *Creatine: Safe for Teen Athletes?*
Time: approximately 40 minutes

Getting Started

NOTE: Do not initially reveal to the students the objectives of this lesson. Ask the students what they know about performance enhancement drugs. Then ask if these drugs are considered safe. See if anyone has heard of the drug *creatine*.

Addressing the Topic

Distribute ARTICLE A or project it on the screen and read the article either together as a class or in pairs to one another. (In this edited version of the article the numbers have been replaced with vague references to amounts. Ideally, as the students read the article they will notice the lack of detail and may become frustrated with the limited quantitative measures.)

Encourage students to comment on the article as it is being read. If none of the students notice the lack of numbers, the teacher may pose some "wondering" questions such as (following paragraph 1) "I wonder how long it *does* take for athletes to notice results?" or (following paragraph 2) "I wonder how many professional football players really do take creatine?" Continue with "wondering" questions that are about quantitative measures that are lacking in the article.

The article can be read in its entirety, or (once the lack of number amounts has been noted) move on to ARTICLE B.

Distribute ARTICLE B or project it on the screen. (In this edited version of the article the numbers have been replaced with groups of choices. One of each group is correct and was taken from the original version). Read the article aloud with the class and stop at the first set of choices. Have students select the answer choice that seems most reasonable. Then, have students read the rest of the article in pairs and decide together which answer choice to select.

Distribute ARTICLE C or project it on the screen. (This version of the article is the original with the complete numbers in place.) Have students read the article individually. (They will be eager to do so to see which choices had been correct.)

Follow-up

Close with a *quick-write* in which the students think and write about the inclusion of numbers and the importance of numbers when writing articles of their own.

Note: This article as originally published can be found at www.scijourner.org

Article A

Creatine: Safe for Teen Athletes?

SciJourner June, 2010

Want to bulk up fast? Want to excel as a competitive athlete? Promoters of the supplement creatine promise a significant increase in muscle mass and overall athletic performance within a few weeks. Weight lifters claim to gain many pounds of muscle mass in only days. Sounds too good to pass up? -

For quite a while, Americans have spent millions of dollars each year on creatine supplements, according to Medline Plus, a service of the National Institutes of Health. Medline also reports that a percentage of professional football players take creatine, so it is not very surprising to learn that the supplement's popularity has filtered down to teen athletes.

Jay Smith, a sports medicine physician at the Mayo Clinic, surveyed a lot of high school students for a study published a few years ago, and found that a percentage regularly use creatine supplements.

Creatine is found naturally in many high protein foods, such as red meat, chicken and fish. But when diet alone doesn't provide the body with an adequate amount, the compound is produced by the liver, kidneys and pancreas. WebMed explains that creatine is then stored in the muscles and used for energy.

Medline Plus reports that creatine can cause muscle cramps, tears and sprains in athletes. Creatine can also make athletes less tolerant of heat and more prone to heat exhaustion. Other side effects listed on Medline Plus include stomach upset, diarrhea, nausea, thirst, headaches, depression, abnormal heart rhythm and blood clots. More serious conditions can stem from taking more than the recommended dose per day, which can lead to kidney damage.

Article B

Creatine: Safe for Teen Athletes?

SciJourner June, 2010

Want to bulk up fast? Want to excel as a competitive athlete? Promoters of the supplement creatine promise a significant increase in muscle mass and overall athletic performance within **(a. 1, b. 2, c. 52, d. 104)** weeks. Weight lifters claim to gain up to **(a. 30, b. 2, c. 5, d. 87)** pounds of muscle mass in less than **(a. 3, b. 7, c. 60, d. 365)** days. Sounds too good to pass up? -

Since **(a. 1776, b. 1812, c. 1967, d. 1998)**, Americans have spent roughly **(a. 1, b. 2, c. 14, d. 245)** million dollars each year on creatine supplements, according to Medline Plus, a service of the National Institutes of Health. Medline also reports that an estimated **(a. 2%, b. 50%, c. 75%, d. 15%)** of professional football players take creatine, so it is not very surprising to learn that the supplement's popularity has filtered down to teen athletes.

Jay Smith, a sports medicine physician at the Mayo Clinic, surveyed **(a. 12, b. 27, c. 106, d. 300)** high school students for a study published in 2000, and found that **(a. 8%, b. 17%, c. 38%, d. 62%)** regularly use creatine supplements.

Creatine is found naturally in many high protein foods, such as red meat, chicken and fish. But when diet alone doesn't provide the body with an adequate amount, the compound is produced by the liver, kidneys and pancreas. WebMed explains that creatine is then stored in the muscles and used for energy.

Medline Plus reports that creatine can cause muscle cramps, tears and sprains in athletes. Creatine can also make athletes less tolerant of heat and more prone to heat exhaustion. Other side effects listed on Medline Plus include stomach upset, diarrhea, nausea, thirst, headaches, depression, abnormal heart rhythm and blood clots. More serious conditions can stem from taking more than the recommended dose of **(a. 1-2, b. 2-5, c. 87-100, d. 275-300)** grams per day, which can lead to kidney damage.

Article C

Creatine: Safe for Teen Athletes?

SciJourner June, 2010

Want to bulk up fast? Want to excel as a competitive athlete? Promoters of the supplement creatine promise a significant increase in muscle mass and overall athletic performance within two weeks. Weight lifters claim to gain up to 30 pounds of muscle mass in less than 60 days. Sounds too good to pass up? -

Since 1998, Americans have spent roughly $14 million each year on creatine supplements, according to Medline Plus, a service of the National Institutes of Health. Medline also reports that an estimated 50% of professional football players take creatine, so it is not very surprising to learn that the supplement's popularity has filtered down to teen athletes.

Jay Smith, a sports medicine physician at the Mayo Clinic, surveyed 300 high school students for a study published in 2000, and found that 8% regularly use creatine supplements.

Creatine is found naturally in many high protein foods, such as red meat, chicken and fish. But when diet alone doesn't provide the body with an adequate amount, the compound is produced by the liver, kidneys and pancreas. WebMed explains that creatine is then stored in the muscles and used for energy.

Medline Plus reports that creatine can cause muscle cramps, tears and sprains in athletes. Creatine can also make athletes less tolerant of heat and more prone to heat exhaustion. Other side effects listed on Medline Plus include stomach upset, diarrhea, nausea, thirst, headaches, depression, abnormal heart rhythm and blood clots. More serious conditions can stem from taking more than the recommended dose of 2–5 grams per day, which can lead to kidney damage.