

## **Productive Student Dialogue for Understanding Science**

Dialogue plays an important role in developing student understanding of science concepts (Lemke, J.L.; National Research Council). Engaging in and generating academic language is a powerful mode of learning for all students, especially English Learners (Gibbons, P.). For many secondary teachers giving students ample opportunity for dialogue presents classroom management issues. One effective approach to this tension is the use of dialogue protocols for managing student dialogue centered on text, data, or activities. Dialogue protocols result in increased rates of staying on topic and the development of deeper student understanding of science.

Gibbons, P., Teaching Second Language Learners in the Mainstream Classroom; Heinemann, Portsmouth, NH; 2002.

Lemke, J.L., Talking Science; Ablex Publishing Corp., Norwood, NJ; 1990.

National Research Council, How People Learn; National Academy Press, Washington D.C.; 2000.

### **Quick Start – a word generating activity:**

**USING THE LETTERS FROM THE WORD  
"PHOTOSYNTHESIS"  
MAKE AS MANY WORDS AS YOU CAN.**

### **RULES**

**NUMBER YOUR WORDS.**

**DO NOT USE 1 OR 2 LETTER WORDS.**

**YOU MAY USE PROPER NAMES.**

**NO ABBREVIATIONS.**

**NO VULGARITY, NO PROFANITY.**

**YOU MAY ONLY USE THREE SINGULAR –  
PLURAL COMBINATIONS.**

**(ASK QUESTIONS IF YOU NEED ASSISTANCE)**

# Understanding Natural Selection: The Concept of Fitness

## Step #1: Problematising Fitness

Adapted from Evolution by Natural Selection

[http://serendip.brynmawr.edu/sci\\_edu/waldron/pdf/NaturalSelectionProtocol.pdf](http://serendip.brynmawr.edu/sci_edu/waldron/pdf/NaturalSelectionProtocol.pdf).

Adapted from the University of California, Los Angeles Life Sciences 1 Demonstration Manual

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Below are descriptions of four male lions. Which lion would biologists consider the “fittest”? Have a dialogue about this problem in your group. Use “Talking Sticks” to structure your conversation. Be prepared to explain your thinking about which is the “fittest” lion.

Name	George	Dwayne	Spot	Tyrone
Age at death	13 years	16 years	12 years	10 years
# of cubs fathered	19	25	20	20
# of cubs surviving to adulthood	15	14	14	19
Size (length)	10 feet	8.5 feet	9 feet	9 feet
Other information	George drove away more male lions trying to take over his family group than the other males did.	Dwayne had the most lionesses in his family group.	A fire burned Spot’s home territory, and he moved his family group to a new area.	Tyrone’s family group included four lionesses.