

Bench To Bedside Action Research Proposal

A Study of the Impact of Sequencing in 10th Grade Biology

Should A Always Come Before B?

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Abstract:

This action research will be done involving tenth grade biology students. These students will be asked to keep a precise lab log as they accomplish the laboratory investigations that accompany their curriculum**. They will be introduced to a computer game that requires them to move sequentially through levels of biotechnology processes. Emphasis will be placed on the importance of learning and doing basic steps before proceeding to the subsequent steps and then to the final product. Comparisons on measures of sequencing success and reading scores will be made, and data will be gathered on student perceptions of the importance of sequenced lab work.

Rationale:

Patterns of organization are everywhere in nature. Cells make up tissue, tissues make up organs, organs make up organ systems etc. We are taught our alphabet before we are taught words. We learn our numbers before we learn to add and subtract. We learn how to throw the ball and catch it before we learn how to play the game. Step one comes before step two. Understanding the patterns and sequencing in text is also a key component in understanding written text. The search for meaning is innate and occurs through patterning. The neocortex automatically makes and detects patterns. (Caine, 1994). When we find a pattern- the interconnection between pieces of information – we create meaning. (Derner, 2004). Teachers must reinforce the ability of students to comprehend what they are reading. One of the five major types of relations in expository texts is time order or **sequence**. (Moss, 2003). There are many words to alert readers to sequence, including: *first, second, then, finally, after, before, following, subsequently and previously*. (Kane, 2007)

Learning and practicing sequencing of activities in the science lab could be an efficient tool in reinforcing the student's ability to more easily sequence events in expository texts. Typical biotechnology labs involve many intricate steps that must be done sequentially. Mission Bio Tech requires that procedures, as well as levels, be done in sequence in order to be successful. "I'd be surprised if any teacher in any subject said sequence was not important." (Kane, 2007)

Teachers are aware of the importance of sequencing even in the order they present their lessons. Students that are involved in a curriculum that requires them to practice and adhere to correct protocol that emphasizes the importance and necessity of precise sequencing will be able to carry this technique over into comprehending expository text.

Action Research Intervention:

The students in tenth grade biology at Williston High School will be involved in a curriculum that is rich in lab based inquiry. The semester will begin with lab techniques and safety and proceed through the basics of molecular and cellular biology and genetics. Each unit will include many sequentially based lab protocols. Students will be required to keep an individual lab log on all activities. They will receive typical lab procedure sheets that give instruction in a sequential manner and be asked to follow these precisely.

Students will be made aware of the key sequence words. Use of these words will be continually stressed.

Throughout the first semester of instruction the biology students will cover the following topics with lecture and lab inquiry; cell structure and function, cell membrane structure and function, DNA

replication, transcription and protein synthesis, photosynthesis, cellular respiration, diffusion and osmosis, enzymes, genetics, viruses and bacteria. There will be a two week segment of biotechnology and how this new field of investigation ties in with the previously mentioned biology topics. The computer game “Mission Bio Tech” will be used to cover the initial investigations that center around biotechnology. The two –week lesson plan will be followed as outlined in the “Mission Bio Tech” teacher manual.

Labs can be wet labs when economically feasible but many will be paper labs or model labs centered around...

- Cell identification
- Cell membrane function
- DNA structure and function
 - Replication
 - Transcription
 - Protein synthesis
- Photosynthesis
- Respiration
- Diffusion and osmosis
- Enzymatic activity

These activities will all be logged by the students in their notebooks. I will keep a portfolio on each student with examples of their lab work throughout the course of this research.

Connections to Bench to Bedside summer institute:

The “Mission Bio Tech” game will be a large portion of the biotechnology connection from this summer’s Bench to Bedside institute. Other procedures that will be incorporated into the semester will include the simulations involving Microarrays and Southern Blot; Genetic Screening; Bacterial Transformations; Protein Crystallization and PCR.

Data Collection and Analysis:

To increase student performance and ability to interpret expository text is important for the student’s overall success in the academic setting.

Students early Think Link test scores (periodic reading test given to tenth graders at least three times a year) will be gathered and correlations between comprehension of text and scores will be determined. The students will be tested again at the end of the semester and those scores will be gathered and the same correlations will be determined.

Student lab log books and portfolios will be assessed. Search for a correlation between increased sequencing activities in biology lab and an increase in reading comprehension will be evaluated.

A Likert evaluation scale will also be developed to administer to students to determine the importance they place on the increased lab procedures and their ability to comprehend text.

Works Cited

Caine, R. N. (1994). *Making connections: Teaching and the Human Brain*. Menlo Park, California: Addison-Wesley.

Derner, M. R. (2004). *Strategies for Great Teaching: Maximize Learning Moments*. Chicago: Zephyr Press.

Kane, S. (2007). *Literacy and Learning*. Scottsdale: Holcomb Hathaway.

Moss, B. (2003). *Exploring the Literature of Fact*. New York: The Guilford Press.

Budget:

43 Lab Notebooks @ 5.00 each.....215.00