Active Inquiry Learning in the Classroom - New Perspectives and Ideas

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Outline

- Rapid introduction to POGIL (Process Oriented Guided Inquiry Learning)

- My inquiry-based teaching experiences in:
    - Math 204   Mathematics for Teachers: Mathematical Immersion
    - Math 464 WI   History of Mathematics   (writing intensive)

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Talk web page: http://d.web.umkc.edu/delawarer/BlochTalk2015.htm

Talk-Related Links on that page:

- POGIL (Process Oriented Guided Inquiry Learning) web site
- We Did the Math! Student Perspectives on Inquiry-Based Learning [AMS Blog posting Dec. 1, 2014]
- Journal of Inquiry-Based Learning in Mathematics web site
- A Mathematical Definition short assignment for any mathematics class
- Math 204
    - Student Testimonials Spring 2009 (2 pages)
    - Student Testimonials/Journal Entries Spring 2012 (5 pages)
    - The Real Number Axioms, Theorems, and Definitions for the course, with my comments on them, and an early take-home assignment about them
- Math 464 WI
    - My "close reading" historical mathematics explication assignment, and an example of a completed such work

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Math 204 Student Learning Objectives

Students will be able to:

demonstrate a grasp of the basics of mathematical reasoning and well-structured proofs through an inquiry-based bottom-up partial development of the real number system (or some other branch of mathematics such as graph theory), beyond just performing mathematical procedures and symbol manipulation;

show they value and can evaluate the culture of human mathematicians and others living mathematical lives, by analyzing and discussing, in the form of short writing assignments or essays, descriptions and various products of that culture

Math 464 WI Student Learning Objectives

Students will be able to:

demonstrate through writing several short explication essays the ability to read closely and analyze critically historical mathematics texts, and articulate and discuss their work with peers and the instructor;

write longer exposition and explication of historical mathematics, articulating and supporting a coherent thesis or purpose meeting the standards of excellent expository writing in mathematics, produced through the process of research, pre-writing, drafting, peer review, and revising in the form of two papers for a total of at least 5,000 words or 20 pages;

use research methods and documentation conforming to the conventions of the history of mathematics and Mathematical Association of America style;

memorize, reproduce, and understand in context a selection of important historical mathematical proofs and arguments

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Details of the first Math 464 WI "demonstrate" objective:

Analyze (closely read) short historical mathematics documents (usually in translation).

(1) Make initial sense of the document (language, specific words, symbols, pictures, unstated references, etc.) and discern the mathematical meaning of the content from a modern point of view.

(2) Determine, with guidance, the historical contextual mathematics argument/process/solution and why it works.

(3) Type and be able to defend an annotated version of the document with expository commentary where needed reflecting the work of (1) and (2).

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