

Vision - Potential

Vision Within Every Instructor – Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium*

Number 29, October 2000

Contents

- [1] The HBCU College Algebra Reform Consortium Fifth Annual Retreat
- [2] The NCTM *Principles and Standards* Come to Life in *Contemporary College Algebra*
- [3] Quiz Questions
- [4] Group Project: “Measuring Up”
- [5] College Algebra Reform at the 2001 National Mathematics Meetings
- [6] Notices

[1] The HBCU College Algebra Reform Consortium Fifth Annual Retreat

Della Bell
Texas Southern University

The HBCU College Algebra Reform Consortium Fifth Annual Retreat was held September 28-30, 2000, Wiley College, Marshall, Texas. The focus of the Retreat was “the involvement of participants in group projects.” Two of the group modeling projects discussed at length were “Do Manatees Have a Future?” and “Earthquakes.” Other agenda items were: (1) A discussion of suggested

* Supported by the EXXON Education Foundation and the U.S. Military Academy. revisions of the *Contemporary College Algebra* text; (2) issues related to conducting a course using the *Contemporary College Algebra* text; and (3) involvement of participants in a Jeopardy (Computer Lab) type activity which could be used in the teaching and learning of mathematics. Participants took copies of the activity home to use in their own schools. The activity can be easily adapted to courses other than college algebra. Mr William Echols, Project Evaluator, presented findings from surveys of faculty and students involved in the HBCU College Algebra Reform Project since 1996.

Retreat participants included Alex Fluellen, Clark Atlanta University; Eugene Taylor, Grambling State University; Jacqueline Giles and son, Karume Giles, and Joel Williams from Houston Community College Central Campus; Dorothy Hunter, Maryam Fatehi, and General Marshall from Huston-Tillotson College; Don Smith from Morris Brown College; Casimir Uchegbu, Philander-Smith College; Laurette Foster, Vera King, and Nelson Butuk from Prairie View A & M University. Also in attendance were Della Bell and Carrington Stewart, Texas Southern University; Don Small, U.S. Military Academy, West Point, New York; and Sarah Bush, Shah Aalam, Edrissa Bangura, and Mr. Talukder from Wiley College.

The retreat was a very worthwhile and positive

experience that provided for a great deal of sharing. The Retreat was financially supported by the Exxon Education Foundation.

[2] **The NCTM *Principles and Standards*
Come to Life in
*Contemporary College Algebra***

**Craig Roberts
Southeast Missouri State University**

In June, I had the privilege of attending the College Algebra Reform Workshop at Prairie View A & M University. Particularly striking to me was the remarkable agreement between the philosophy and goals stated in *Contemporary College Algebra* and the Reform Workshop and those stated by the National Council of Teachers of Mathematics (NCTM) in the recently released *Principles and Standards for School Mathematics*. As the workshop progressed, it also was readily apparent that the student-centered instructional strategies advocated in *Contemporary College Algebra* are consistent with the *Principles and Standards*. This is especially noteworthy because it provides for a seamless transition from the mathematical experiences we hope our students had at the elementary, middle, and high school levels and the mathematical experiences we hope to engage them in at the college and university level.

The *Principles and Standards* was officially released at NCTM's Chicago meeting in April 2000, and its purpose is to build on and consolidate the philosophy and goals set forth in previous NCTM publications. It contains a very ambitious vision for mathematics education. It is a vision in which "Students are flexible and resourceful problem solvers. Alone or in groups and with access to technology, they work productively and reflectively, with the skilled guidance of their teachers. Orally and in writing, students communicate their ideas and results effectively. They value mathematics and engage actively in learning it." (NCTM, 2000,

p. 3) This vision is founded upon six principles, which should be features of any quality mathematics program. These principles are Equity, Curriculum, Teaching, Learning, Technology, and Assessment. Briefly, the Equity Principle advocates high expectations for all students and providing the necessary support to help each one achieve these expectations. The Curriculum Principle emphasizes a focus on important and interesting mathematics pertaining to the real world. The Teaching and Learning Principles stress student-centered instructional approaches that actively engage students in exploration, discovery, and understanding of mathematical concepts with the supportive guidance of their instructor. The Technology Principle views technology as a means for enhancing the understanding of fundamental mathematical concepts and for considering interesting real life applications, not as a substitute for basic understanding. Finally, the Assessment Principle states that an assessment plan must include formal and informal assessments that are consistent with the instructional approaches used and that reflect the important mathematical concepts studied. (NCTM, 2000, pp. 11-27)

While these six principles form consistent themes throughout a quality mathematics program, five Content Standards and five Process Standards describe the knowledge, skills, and processes that students should acquire. The Content Standards are Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability. The Process Standards are Problem Solving, Communication, Connections, Representation, and Reasoning and Proof. (NCTM, 2000, p. 29)

The objectives advocated within the Algebra Standard are especially interesting. Students should "understand patterns, relations, and functions" and "use mathematical models to represent and understand quantitative relationships." (NCTM, 2000, p. 37) Nowhere is the emphasis placed on algebraic manipulation and computational skills. Rather the emphasis is placed on understanding fundamental

algebraic concepts such as functions and utilizing mathematical models to understand the world from a quantitative perspective.

It is within this context that computational and algebraic skills may be effectively developed and reinforced. It is in relation to the Process Standards that *Contemporary College Algebra* shines even more brightly in my opinion. While students often forget specific mathematical content over time, the general thought processes and attitudes that each student acquires may remain for a lifetime and profoundly influence the opportunities that become available. If a student can become confident about analyzing problems from a quantitative perspective, flexibly applying various technologies and problem-solving strategies, and working with others to solve problems, then he or she has formed the foundation for becoming a lifelong, exploratory learner and a productive member of the fast-paced, technological world.

As we reflect on the philosophy and goals mentioned in the Preface of *Contemporary College Algebra* (namely, empower students to become exploratory learners, improve communication skills, participate in group work, use technology, model real life situations, develop confidence as problem solvers, and enjoy doing and applying meaningful mathematics), they are remarkably consistent with those of the *Principles and Standards*. (Small, 1999, p. vii) While the *Principles and Standards* were specifically written for prekindergarten through grade 12, I believe the manner in which they are reflected in *Contemporary College Algebra* should serve as a model for transforming other college and university mathematics texts and courses into student-centered texts and courses. I heartily congratulate Dr. Small and the Editorial Board Members for their visionary approach to College Algebra Reform and their efforts to help every student reach his or her full potential.

(Note: An electronic version of *Principles and Standards* may be viewed on the World Wide Web at

<http://www.nctm.org/>)

References:

National Council of Teachers of Mathematics, *Principles and Standards for School Mathematics*. Reston, VA: National Council of Teachers of Mathematics, 2000.

Small, Don. *Contemporary College Algebra*. New York; The McGraw Hill Companies, Inc., 1999.

[3]

Quiz Questions

1. On a camping trip, Scouts constructed two lean-tos. They both measured ten feet long and six feet deep. The roof line (from back to front) of one followed the graph of $2y = 10x$ and the roof line of the other followed the graph of $y = 7x$. Which lean-to contained the larger volume? Explain.
2. Three people sit on a see-saw. Jed, who weighs 140 pounds, sits at one end ten feet from the fulcrum. On the other side of the see-saw, Carol, who weighs 120 pounds, sits 4 feet from the fulcrum and Doris sits 7 feet from the fulcrum. If the see-saw is balanced, how much does Doris weigh? Explain.
3. If the cost of stringing x tennis rackets is modeled by the cost function $c(x) = 23x + 50$, what does the "50" represent? Explain.
4. Determine how high a Sammy Sousa home run ball goes if its path is modeled by the function $a(t) = -0.003x^2 + 1.2x + 2$. Explain.
5. Otis has a two foot piece of picture frame molding that he is going to cut into four pieces to form a rectangular picture frame. What is the area of the largest rectangular picture that he can enclose with his frame? Explain.

[4] Group Project: “Measuring Up”

When drawing teenagers, some artists follow the rule of thumb, “draw a teenager 7 head-lengths tall.” This supposedly helps them produce a drawing in which the head is correctly proportioned to the body. This activity will help you decide if there is any basis for this rule of thumb.

Carry out the following tasks:

1. Measure the head length (from bottom of chin to top of head) and height of 10 teenagers ages 18 - 20. Record the results in the first two columns of a three column table. Clearly label the columns and indicate your units of measurements.
2. Record the “rule of thumb height” in the third column.
3. Plot the actual heights versus the head lengths.
4. Use your calculator to compute the linear regression model of the actual heights to the head lengths.
5. Create a multiplot consisting of the data plot of actual heights versus the head lengths, the plot of the regression line, and the plot of the rule of thumb heights versus the head lengths.
6. Write a brief description summarizing the results of your investigation.

If time permits, it would be interesting to carry out a similar investigation for different age groups. How do you think the rule of thumb should be modified (if at all) for children from 5-10 years old, adults from 40-45 years old, and seniors from 85-90 years old? Explain your reasoning.

**[5] College Algebra Reform
at the 2001 National Mathematics Meetings**

The National Mathematics Meetings that will be held in New Orleans, January 10-13, 2001, will offer several programs directed at College Algebra Reform. The activities include

- a. Minicourse #12: “Contemporary College Algebra, a Reform Program.” Organized by Laurette Foster (Prairie View A & M Univ.), Dorothy Hunter (Huston-tillotson College), Don Small (US Military Academy) Wednesday and Friday mornings 8-10:00.
- b. Contributed Paper Session: “Redefining What a Modern College Algebra Experience Means.” Wednesday and Thursday mornings.
- c. Panel: “Redefining College Algebra Courses” organized by Shelly Gordon. Panelists include Alex Fluellen (Clark Atlanta Univ.), Don Small (US Military Academy). Wednesday 2:15-3:45 PM.
- d. College Algebra Reform Poster Session organized by Dorothy Hunter and Ahmad Kamalvand (Huston-Tillotson College), Don Small (US Military Academy). Friday 9-11:00 AM.
- e. “Open Discussion on Reforming College Algebra” Organized by the HBCU Consortium for Reforming College Algebra. Panelists include Della Bell (Texas Southern Univ.) and Sarah Bush (Wiley College). Saturday 2:45-4:15 PM.
- f. Annual meeting of Local Coordinators and Instructors of Contemporary College Algebra. Friday 2:30-5:00 PM

There are a number of other sessions in which the subjects being discussed have a bearing on reforming College Algebra such as the Panel Discussion on “How to Facilitate Change.”

[6] Notices

1. The Deadline for contributions to the November Newsletter is Monday, November 6, 2000.
2. To subscribe to this Newsletter or to submit articles write to Dr. Della Bell, Chair, Dept. of Mathematics, Texas Southern University, 3100 Cleburne St., Houston, TX 77004.