

Vision - Potential

Vision Within Every Instructor – Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium*

Number 18, February 1999

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- [1] **CHANGE**
Bob Witte
Senior Program Officer
EXXON Education Foundation

(The following remarks were delivered by Bob Witte to the Local Coordinators of the HBCU College Algebra Reform Consortium at their meeting during the Joint Mathematics Meetings in San Antonio, Texas, January 1999.)

I am pleased to be with you and appreciate your sharing your reports with me. Many people think of our Foundation as a source of funds to support worthwhile projects. That is true, but I think you are learning, from your work with the College Algebra Reform Project, that we are really in the

* Supported by the EXXON Education Foundation and the U.S. Military Academy.

business of CHANGE. There are many needs and many opportunities for improving education today. We think we are good at finding people with both the right ideas and the strength and courage to lead those changes. So, whether you have realized it, or not, the fact is that you, too, are now in the “change business.”

Change is not easy. First, you have to do the hard work of change in addition to your other work. Second, most of us, and most of our institutions do not like change. Your reports about students learning more algebra; about students being more interested in your courses; about students working harder at projects and problems they have tackled before, and about students succeeding where they may have failed in the past—all these changes you are seeing—raise questions about the old ways of teaching college algebra. Because of this, I am not surprised to hear that others in your institutions are skeptical or even uncooperative as your pilot courses expand. This is universal and quite natural, so I urge you not to take those reactions personally. You know that your reformed college algebra course, and your new textbook, will not be perfect. Because of that, thoughtful criticism and critique is important—and you need this feedback from each other and from your colleagues.

There are several good things about this kind of work for change as well. Your work in the classrooms and with students is complex. This means

that it can be difficult, and it takes time, to prove the value of the reforms you are working to create. I believe the best information about how your work is progressing comes from your students. Indeed, your reports today have been mainly about what is happening to your students. This is what our colleges and universities are supposed to worry about. The good part of such change work is that you are the first people to know that you are helping students. So I encourage you to talk with your students and to work together to understand and to interpret what you are learning.

And there is more good news for those of you who have joined in the change business. Yesterday, several of you were leaders in a panel discussion on College Algebra Reform. I must tell you that I had wondered how many people would be interested in College Algebra Reform; especially with the great interest in Calculus Reform at these meetings. Well, I was surprised and delighted that you had standing room only attendance that spilled into the outside hallway with over 100 math professors from all over the country. Your panel heard many interesting questions.

This shows that you are not in this College Algebra Reform business alone. You saw both the number and strong interest of all those faculty members who share your interest and who are also working to change college algebra. You can bet those people will be back at your meetings next year, and will be anxious to hear about your progress. You know they want you to succeed, and because of that, you have an obligation to them.

The Foundation has learned that the main reason its projects succeed is because the people who are leading those projects—faculty like yourselves—those people have decided that they will not let their projects fail. I want you to remember that you do have friends and supporters. I know you all strongly support each other. You also have the others you have met at these meetings, and you certainly have friends and supporters at EXXON. I want you to know that you have our best wishes,

and I look forward to learning about your continuing progress.

Editor's note: Beginning in 1996, the EXXON Education Foundation has awarded three grants to support the HBCU College Algebra Reform Project, totalling \$106,900. This Project is part of the Foundation's Undergraduate Science, Technology, Engineering, and Mathematics Program, called "STEM.")

**[2] HBCU College Algebra Consortium
Local Coordinators Meeting**

**Della Bell
Texas Southern University**

The HBCU College Algebra Reform Consortium Local Coordinators' Meeting was held Friday, January 15, 1999 in Patio B, Convention Center, San Antonio, Texas from 3:15 to 5:45 PM. The meeting was held in conjunction with the Joint Mathematics Meetings, San Antonio, Texas, January 13-16, 1999. Individuals present included Eugene Taylor, Grambling State University; Jackie Giles and Joel Williams, Houston Community College Central Campus; William Echols, Houston Community College Northwest Campus; General Marshall, Dorothy Hunter, M. Fatehi, and Ahmad Kamalvand, Huston-Tillotson College; N. Nagarajan, Paul Quinn College; Laurette Foster, Tommie Hill-Natter, and Vera King, Prairie View A&M University; Della Bell, Victor Obot, and Carrington Stewart, Texas Southern University; Sarah Bush, Wiley College; and Don Small, U.S. Military Academy. Mr. Bob Witte, Senior Program Officer of the EXXON Education Foundation, Irving, Texas also attended a portion of the meeting.

Agenda items for the meeting included the following: (1) Reports from field-testing of the Contemporary College Algebra textbook; (2) The Calculator Report which included issues dealing with the distribution of calculators; (3) Comments on student small group projects; (4) Announcements concerning future faculty development activities; (5) Evaluation Report by William Echols; (6) Com-

ments by Mr. Bob Witte; and (7) An evaluation activity conducted by William Echols.

Several Local Coordinators participated in selected sessions of the Joint Mathematics Meetings. General G. Marshall was a panelist on a panel on College Algebra Reform that was moderated by Don Small. Sarah Bush, Eugene Taylor, and Don Small organized a College Algebra Reform Poster Session. Students LaDawn Cottongim and Kristina Reece, from Prairie View A&M University, and Linton Weatherspoon and Loretta Chue, from Texas Southern University, participated in the MAA presentation on Students Reports. The reports dealt with "Using the World Wide Web to Enhance the Teaching of Mathematics." The project was under the leadership of Marie Vanisko and John Scharf, Carroll College, Helena, Montana, and Don Small, U.S. Military Academy. Laurette Foster and Della Bell sponsored the students from Prairie View A&M University and Texas Southern University. In addition, Della Bell and Jackie Giles participated in several NAM activities. Local Coordinators and other participants of the HBCU College Algebra Reform Consortium also attended other sessions, viewed the exhibits, and participated in other committee meetings. Participation in the activities of the Joint Mathematics Meetings enhanced the professional growth of all persons attending.

[3] Quadratic or Exponential

The functions $f(x) = x^2 + 1$ and $g(x) = e^x$ have similar shapes when their domains are restricted to the non-negative real numbers, Although when plotted together, it is clear that the exponential function grows faster than the quadratic function as shown in the following multiplot

However when given the plot of data, it may not be obvious that the shape of the plot is quadratic, exponential, or something else. For example, consider the data taken from the Scott Standard Postage Stamp Catalog on the number of U.S. Stamps Issued (cumulative).

<i>Year</i>	<i>No.of Stamps</i>
1888	218
1908	341
1928	647
1948	980
1968	1364
1988	2400

The plot of this data is

Is the shape of the data quadratic or exponential or something else?

Logarithm to the Rescue: Suppose the the shape of the data is exponential and suppose the graph of $f(t) = ce^{mt}$ "fits" the data. Now taking the natural logarithm of both sides of this equation gives

$$\ln[f(T)] = mt + \ln(c)$$

The graph of this equation is a straight line with slope m .

Now suppose the shape of the data is quadratic and suppose the graph of $g(t) = ct^2$ "fits" the data. Taking the natural logarithm of both sides of this equation gives

$$\ln[g(t)] = 2\ln(x) + \ln(c)$$

The graph of this equation is a logarithmic curve, not a straight line.

Thus plotting the logarithm of the dependent variable against the independent variable will tell us whether or not the basic shape of the data is exponential. If the points of the resulting plot fall on a straight line, the basic shape of the data is exponential. If the points fall along a logarithmic curve, the basic shape of the data is quadratic.

We now return to our postage data, add a third column representing the logarithm of the dependent variable, and then plot the third column against the first column.

<i>Year</i>	<i>No.of Stamps</i>	<i>logarithm</i>
1888	218	5.384
1908	341	5.832
1928	647	6.472
1948	980	6.888
1968	1364	7.218
1988	2400	7.783

The points in this plot nearly lie on a straight line and thus the basic shape of the data is exponential. That is, $f(t) = ce^{mt}$.

To solve for the constants c and m , we substitute the coordinates of two data points, say (1908, 341) and (1988, 2400), into this functional equation. This gives the two equations

$$341 = ce^{m1908} \quad \text{and} \quad 2400 = ce^{m1988}$$

Dividing the second equation by the first equation, gives $\frac{2400}{341} = \frac{ce^{m1988}}{ce^{m1908}}$ and so $\ln\left(\frac{2400}{341}\right) = 80m$. Thus

$$m = \frac{1}{80} \ln\left(\frac{2400}{341}\right) = 0.024$$

Substituting this value of m into the second equation gives $2400 = ce^{47.172}$ and therefore $c = 4.562 * 10^{-18}$.

We visibly check our result by superimposing the plot of $f(t) = 4.562 * 10^{-18} e^{0.024t}$ and the postage data.

[4] **In-class Activity: Sales on Sales**

Many major clothing stores offer late January sales. On January 27, 1999, the Lord and Taylor clothing store ran a full page ad in the New York Times

IT'S OUR WINTER SALE
50% OFF

Use EXTRA 20% OFF coupons for greater savings! The ad contained six coupon boxes offering additional savings. One box read

ADDITIONAL 20% OFF
All Her Wool Coats, Casual Jackets
Leathers & Rainwear Already reduced 25% to 50%
Savings up to 60%

If you used this coupon to purchase a wool coat that was originally on sale at 50% OFF, shouldn't your savings be 70% rather than the 60% stated in the coupon? Explain.

[5] **Notices**

1. A workshop on developing Interdisciplinary Lively Application Projects (ILAPs) will be held at Prairie View A&M University on February 25-26, 1999. Contact Dr. Laurette Foster for information.
2. The Deadline for contributions to our March Newsletter is

Friday, March 5, 1999

Opinion articles, suggestions for writing assignments, small group in-class activities, small group out-of-class projects, Queries, CBL activities, announcements, and so on are all welcomed. Please send material to Dr. Della Bell, Chair, Dept.of Mathematics, Texas Southern University, 3100 Cleburne St., Houston, TX 77004.

4. To subscribe to this Newsletter, send your name and address to Dr. Della Bell, Department of Mathematics, Texas Southern University, 3100 Cleburne St.,Houston, TX. 77004