Vision - Potential

Vision Within Every Instructor – Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium*
Number 25, February 2000

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[1] The HBCU College Algebra Reform Consortium, Local Coordinators Meeting

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The HBCU Local Coordinators' Meeting was held Friday, January 21, 2000 in the Thomas Payne Room, Marriott Washington Hotel, Washington, D.C. The meeting was held in conjunction with the Annual Meeting of the Joint Mathematics Association. Individuals present included: Alexander Fluellen of Clark Atlanta University, Eugene Taylor of Grambling State University, and Joel Williams of Houston Community College Central Campus.

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

Also present were William Echols of Houston Community College Northwest Campus; Dorothy Hunter, Ahmad Kamalvand, and General Marshall, each of Huston-Tillotson College; Laurette Foster, John Gardner, and Vera King of Prairie View A&M University. Additional persons present were Della Bell, Victor Obot, and Carrington Stewart of Texas Southern University, Sarah Bush of Wiley College; and Don Small of the U.S. Military Academy. Mr. Bob Witte, Senior Program Officer of the EXXON Education Foundation, Irving, Texas was also present.

Agenda items for the meeting included the following: (1) a discussion of each of the three student projects for the Contemporary College Algebra course, Spring semester, 2000; (2) participant reports on their experiences in the implementation of the Contemporary College Algebra Course; (3) comments from Mr. Bob Witte; and (4) comments from the Project Evaluator, Bill Echols, concerning results from various surveys taken since our initial involvement in the Contemporary College Algebra program.

Participants were involved in various activities during the joint meetings. Della Bell, Ahmad Kamalvand, and Don Small were organizers of two contributed paper sessions in which 20 presenters reported on various College Algebra Reform programs. Della Bell and Ahmad Kamalvand gave a

presentation on the Contemporary College Algebra Program. Laurette Foster was a panelist on the topic "Changing the Academic Culture." She was also one of the presenters of the mini-course on Interdisciplinary Lively Application Projects. Della Bell, Alex Fluellen, Laurette Foster, and Carrington Stewart were participants on a MAA "Focus Group" organized by Don Small that addressed the topic "Mathematical Needs of Students by the Year 2010." Most of the members of the HBCU College Algebra Consortium were active participants in a two-hour "Open Discussion on College Algebra Reform." Participants attended other sessions, exhibits, demonstrations, and receptions. The Joint Mathematics Meetings were well attended (over 4000 participants). A large variety of sessions covering a wide range of interests were available to attendees.

[2] Our Technological World

A sometimes contentious issue in the debate over reforming college algebra is the student use of technology. The issue spans the spectrum from encouraging unrestricted student use of graphing calculators, computer algebra systems, and spread sheets to forbidding their use entirely. Those who favor the use of technology for teaching and learning point out that we live in a technological world, the information age is driven by technology. Thus preparing our students to become contributors to society includes providing them with experience in using technology to solve realistic problems as is done in the real world. This includes displaying data, plotting functions, developing regressions, iterating, and carrying out complicated and/or tedious computations. The reformers bolster their arguments by arguing since college algebra, or its immediate follow-on course, is terminal for the large majority of students taking college algebra, the focus of the course should be on developing "mathematics life skills" rather than on remediating high school algebra. These life skills which include displaying data, extracting information from data, and transforming information into knowledge require the use of technology.

Those who argue against allowing students to use technology are concerned about the loss of hand computation skills. Skills that are, or at least were, important in higher level mathematics courses. Factoring is often cited as an example. The traditionalists point to the need for understanding factoring in order to integrate using the method of partial fractions. The reformists reply that partial fractions has been moved from most calculus courses to third or fourth year engineering-math courses where it is taken up in connection with Laplace Transforms. There is widespread agreement that using graphing calculators and computers does detract from the development of hand computation skills. The issue is: How important are hand computation skills? What are the parameters that can be used to frame the debate? (Volume is probably not a suitable parameter.) We are fortunate to live in the midst of this debate and have opportunities for contributing to it.

There is agreement on at least one fact. The rate of development of technology is growing exponentially. The graphing calculator was first introduced in the mid nineteen eighties, but did not start to become widespread until the nineteen nineties. The desktop PC also dates from the mid nineteen eighties. Calculators and computers just a few years old seem very slow and limited compared to new ones. The "time to obsolescence" is rapidly decreasing. Dr. William Pulleyblank, a Director for IBM's Deep Computing institute has said that Moore's Law will continue to apply for at least the next fifteen years. This law states that the number of transistors that can be placed on a chip of a given size will double in less than eighteen months. This implies that major advances in speed and memory will continue to be realized. The following article gives a glimpse of what will be part of the world into which our students are graduating.

The Bleeding Edge

Bleeding edge is the only way I can describe IBM's plans to create a million-CPU supercomputer, which promises to break quite a bit of new ground. For example, each processor chip actually contains 32 complete processors, which are special 57-instruction (vs. typically 200 instruction) RISC (Reduced Instruction Set Computer) processors. Each board will contain 64 of these chips, and each of 64 towers will contain 8 boards. Do the math-that's a LOT of processors. And unlike most computers today, this computer's memory will reside on the same chips as the processors, dramatically speeding up memory access! This behemoth, which will use 6 gallons of water every second for cooling, will chug out calculations 500 times faster than todays supercomputer kings – a petaflop, or a thousand-trillion FLoating Operations Per second. Remember those huge numbers you used to toss around as a kid? Well, you can now use 'em and mean 'em: this is a QUADRILLION operations each and every second. Trying to put this into terms that mean something to mere mortals, the December 6, 1999 *New York Times* (http://www.nytimes.com/library/tech/99 /12/biztech/articles/06blue.html) suggests that if a fast contemporary PC were one inch tall, this computer would stretch 20 miles high. In fact, they expect it to work at the speed of life. That's because the goal of this five-year, $100-million computer is to work with data derived from the human genome project to simulate how amino acids turn into proteins - a process key to how our bodies work. This computer is called Blue Gene, and some expect that pushing computing limits in this direction will generate lots of very positive fallout, helping advance other simulation work long before it ever reaches its ultimate goal. The field is called computational biology, and this is a good example of how bleeding edge computers, plus gifted researchers, plus vision, hold the potential to change our world. Of course, nature still has the upper hand. Blue Gene should take about a year to simulate the folding of amino acids into one protein-something our bodies do many times a day, in less than one second.

(This article is an excerpt from the Rapidly Changing Face of Computing, a free weekly multimedia technology journal written by Jeffrey Harrow, a senior consulting engineer for the Technology and Corporate Development group at Compaq. A more extensive version of this discussion, as well as others around the innovations and trends of contemporary computing and the technologies that drive them, are available at http://www.compaq.com /rcfoc. Jeff's opinions do not necessarily reflect the opinions of Compaq. The RCFoC is Copyright 1999, 2000, Compaq Computer Corporation.)

[3] The Cost of Government

On February 7, 2000, President Clinton submitted his 1.84 trillion dollar budget to Congress. This is the federal budget for the year 2001. The "Evening News" on that day stated that the new budget represented a 2.5% increase over the previous budget, that is the year 2000 budget. The budget announcement raised a few intriguing questions such as: How does one comprehend 1.84 trillion anything? Is the "per person" amount of the new budget more or less than the per person amount for the previous budget? (Because both the population and the budget have increased, it is not clear how the per person amount changed.) A quick check of the Web under U.S. Census Bureau showed the projected U.S. population on July 1, 2000 is 275,306,000 and for July 1, 2001 is 277,803,000. Using this information, do the following:

a. Determine if the per person amount of the 2001 budget is more than the per person amount of the 2000 budget.

b. Assuming an inflation rate of 2.5%, is the rate of change of the per person amount more or less than the inflation rate?

c. Write a one page essay on how to comprehend the amount of 1.84 trillion. (For example, if

dollars were beans, how many pounds would 1.84 trillion beans weigh? Or, if dollars were facial tissues, how many boxes of facial tissues would 1.84 trillion tissues make?)

[4] Political Sound Bite

In a piece in *The New York Times*, 23 January 1992, by John Tierney, p.1, entitled "Sound Bites Become Smaller Mouthfuls," the following data was given on the average uninterrupted time (in seconds) during which a Presidential candidate spoke in an appearance in the evening news for the years 1968, 1972, 1976, 1980, 1984, 1988.

$Year$	$Length(sec)$
1968	43.1
1972	25.2
1976	18.2
1980	12.2
1984	9.9
1988	8.9

From the data does it appear that we are really headed for 0 sec. length sound bites or are we destined to level off at some time interval? What does that suggest about a function (model) that fits the data?

The article says, "If this decline - 3.4 seconds in two years, or 0.17 seconds per year over 20 years - were to continue at a linear rate, the average sound bite in 1992 would be 2 seconds long, perhaps something along the lines of 'Me President, you voter.' A more conservative extrapolation would be in the range of 6.5 to 8.5 seconds, which could be enough for a complete clause."

Plot this data, recognize the basic shape of the data, and then graphically develop a function whose graph fits the data and has a reasonable long term behavior. Based on your function, what do you predict will be the average length of a sound bite for our Presidential candidates on the evening news this year?

[5] William Wulf's Comments on Change

(William Wulf, President of the National Academy of Engineering, spoke on "The Urgency of Engineering Education Reform" at the Interdisciplinary Workshop on Core Mathematics, held at the U.S. Military Academy in November 1999. Mentally replace the word "engineer" with "mathematician" when reading his comments. How applicable are his comments to college algebra reform? Editor)

"My father was an engineer. ... For my father there was a little book on a shelf, a little thin book, of the materials that he had as an option to design with. There were half a dozen different kinds of steel, there were a few kinds of bronze, plastic was not in his vocabulary, fibers were not in his vocabulary, composite materials were not something he considered. Well, now we are talking about designer materials. That is, the ability for an engineer to say these are properties that I want the material to have and at least potentially the possibility of producing that material for the subject. Literally that thin book has become an infinite set of options.

Industrial practice is now very much oriented around marketing people, engineers, financial people, etc. working together on a product. That is an environment in which the engineer we are training today is not equipped to operate. ... The engineer who is trained superbly in a technical sense but does not understand the cultural and social issues in a very broad sense, in a multicultural sense, is really useless. The pace of change is itself a change. ... It has not been part of the engineer's culture to feel responsible for their own lifelong learning and I think that has to change. There is a bunch of stuff that needs change: curriculum, pedagogy, faculty award system, the need for formalized life long learning, preparation for K through 12, and technological literacy of the general population."

[6] Notices

1. The Deadline for contributions to the March Newsletter is Monday, March 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.