The BEACON

News from The Coalition for Excellence in Science and Math Education

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HIGH SCHOOL REFORM

The issue of high school reform proposals submitted by the State Department of Education has been much in the news lately. Saturday's Albuquerque Journal had a front-page story with quotes from members of the State Board of Education and the State Legislature. Comments so far have concentrated on the superficial without demonstrating any real understanding of the purposes and benefits of the changes.

It has been said that the state should not reduce requirements. This is in response to the total number of units required to graduate being reduced from 23 to 20. But what are the 20 that are required and what were the three that were given up? As Marshall Berman has stated, we should not confuse learning with "seat time."

Also, there seems to be much discussion over the elimination of compulsory physical education (one of the three removed). There may be a valid point here. I don't think that phys-ed really does anything to reduce the "fattening of America," but I remember from High School that phys-ed was a nice break from the grind of classes even though I was among the less physically coordinated in the school. At that time (over 40 years ago) phys-ed was required for more years than it is now, and frankly I don't think it really was a benefit to students after the first two years.

The point of this missive is that we should find out what the new proposals say and what the ramifications of each change are. It would be a good idea if the State Department of Education publicized the details of the proposals both to our citizens and our legislators. Legislative approval will be required if the changes are to take effect, and right now it appears that nothing will happen if the only sound bite they hear is "reduction in requirements."

Bill MacPherson
CESE President

CESE TO THE RESCUE!

One never knows how something that is done today will affect the future. A case in point occurred recently when CESE member Jack Jekowski was called upon by Ben Montoya of the Kirtland Partnership Committee (http://www.kpc.nm.org/index.htm) to help with the writing of a briefing paper that painted a positive picture of APS and the education system in New Mexico. (Jack had shown the data from the CESE White Paper on student achievement and governance to the Governor's Business Executives for Education [GBEE] several months ago, and Ben was impressed by the information. He immediately realized that decisions were being made on governance and other issues

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without an adequate discussion of the facts.) Ben's request was driven by a statement made by military personnel involved in the new round of Base Closures that one decision factor was the quality of schools in proximity to bases, and that APS and New Mexico were known for their poor schools (an unfortunate characterization created by the media and others.)

Jack went to his list servs, including CESE, and requested help. The result is a seven-page paper entitled "*The Sky is Not Falling: What's Right About Education in New Mexico and Albuquerque Public Schools*." The paper uses the data from the CESE White Paper to characterize the positive aspects of the state's accountability system, focusing on those schools most in need. It also provides data that never makes the newspaper on how APS fares quite well against the top 100 school districts in the country (APS is about number 27 in the country). The reaction to the paper has been astounding—people have grown tired of the constant bashing of our education system, and this seems to have been a breath of fresh air.

Along the way, CESE has gained some stature in the business community.

BOOK REVIEW

SEEING IN THE DARK

By Timothy Ferris

Seeing in the Dark is a love song to the amateur astronomer. The word amateur comes from the Latin word for lover. An amateur follows a particular pursuit out of love for it, rather than for money as does a professional. This does not mean that an amateur can not be as proficient in his following as the professional, just that s/he probably will not have access to the most powerful research tools, in this case gigantic telescopes. But as Ferris points out, professionals frequently do not have the time to pursue research that they would like to because observing time on the world-class instruments is very strictly rationed. Professionals have turned to amateurs in many instances to help fill in the blanks. This book covers that collaboration and documents the many contributions amateur astronomers are making to our overall knowledge of the Universe.

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Ferris intersperses real and imaginary visits to amateurs and professionals of past and present with descriptions of his own observations. Some of his best writing describes the observatories of very serious amateur astronomers whom he has known and the descriptions of his own observatory. One thing that is counterintuitive is that the clearest skies don't always produce the best "seeing." He described one amateur observatory in Florida where the sky is not often clear, but when it is, it is extremely clear and the flow of air across the site is close to laminar. This lack of turbulence affords exquisite seeing.

Ferris gives the reader a tour of the entire universe, starting with the moon, the sun, the planets, the minor planets, meteors, Kuiper belt and Oort cloud objects (comets) and going on to the deep sky objects within the Milky Way and on out to the galaxies. Many of the descriptions are very detailed for a book so general in nature.

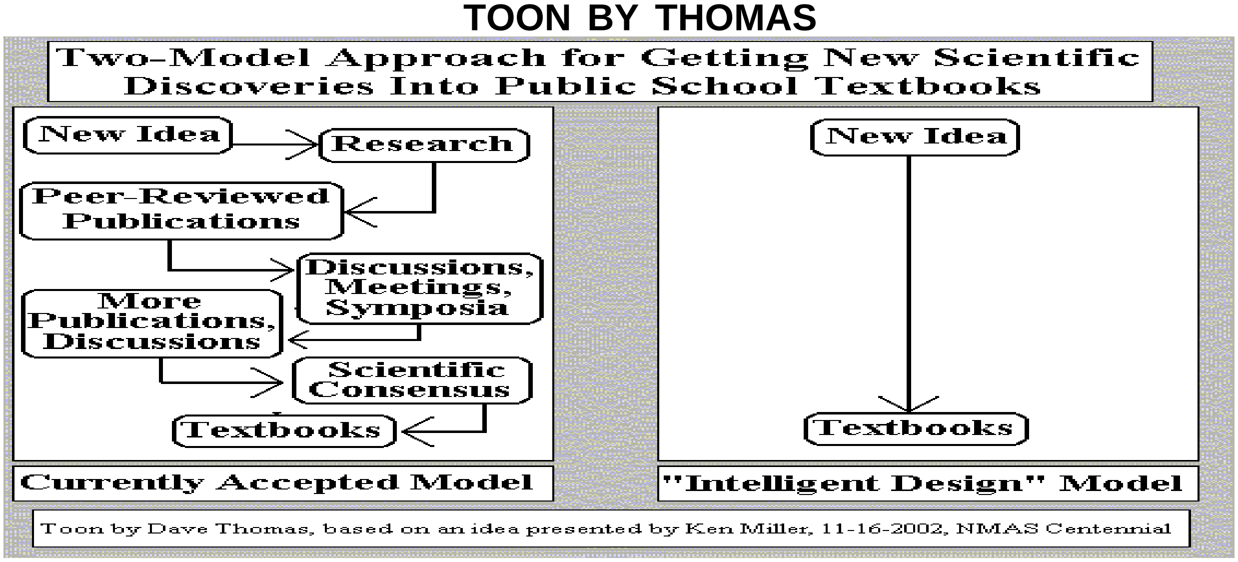
It is now possible for amateurs to get observing time on telescopes around the world through the internet, so even if it's cloudy at your observing site, you can get pictures sent via the Internet to your computer of whatever you needed a picture of. And since the advent of the CCD (charge coupled device), it is no longer necessary to stay outside with the telescope on a cold night. You can hook the camera up to a computer and stay inside watching the screen. The net effect of all this, however, is to remove the astronomer from the astronomy. It's almost as if you, the astronomer, were superfluous and the automated telescopes, CCD cameras and computers would do everything for you, and you wouldn't even need to be there.

For most of its long history astronomy has been dominated by amateurs. Copernicus, Kepler and Halley were all amateurs. Indeed most scientists were amateurs, since there wasn't much in the way of paying jobs for scientists unless they received a royal commission. Amateurs made most of the important discoveries before the nineteenth century, and continued making important discoveries into the early twentieth. But when it became necessary to have a formal education and large telescopes to continue making discoveries, the amateur was looked down upon by the professional. The situation changed again by about 1980. To quote Ferris, "A century of professional research had by then greatly increased the range of observational astronomy, creating more places at the table than there were professionals to fill them. Meanwhile the ranks of amateur astronomers had grown too, along with the ability of the best amateurs to take on professional and to pursue innovative research." It may be more difficult to tell the two groups apart in the future. Again quoting Ferris, the three innovations that raised up the amateurs again were, "the Dobsonian telescope, CCD light sensing devices and the Internet."

As an amateur astronomer myself, I thoroughly enjoyed this book and recommend it to anyone who would like to find out more.

Bill MacPherson

TOON BY THOMAS



EXPERIMENTAL DESIGN

Most scientists and engineers have run many experiments in their careers. We state a hypothesis prior to conducting our experiment. A *critical experiment* has only two possible outcomes. One outcome would unequivocally confirm our hypothesis. The other outcome would absolutely disconfirm our hypothesis. We can't count on finding a critical experiment, but statistics can give reasonable confidence that a hypothesis has been either confirmed or disconfirmed.

Experiments seldom have clear outcomes. The best we can usually say is "Well, it worked that time, but next time, who knows?" We try to set up test conditions so that there is only a slight probability that an apparent outcome is just due to the luck of that particular draw. For example, suppose our hypothesis is "Kids whose parents read to them when they were small will read better than kids whose parents have never read to them." We won't be allowed to choose the smartest kids from the "read to" class and the slowest from the "never read to" class, and it is impossible to test all the kids in the country. We will have to randomly choose N kids from each group. Random selection helps to minimize cheating. Experimental controls prevent hanky-panky and reduce the effects of nuisance variables.

Our *experimental hypothesis*, stated in writing before the experiment, is that "read to" kids will read better than "not read to" kids. The opposite is the *null hypothesis*, that there is no advantage for "read to" kids. This is a *directional hypothesis* because we said "better." A *non-directional hypothesis* simply says "different." The goal of experiments is to confirm the experimental hypothesis, but the way we usually do it is to show that the null hypothesis has only a small probability of being true. This is the province of *inferential statistics*. Because we only talk about the probability of the null hypothesis being false, we could be wrong. Suppose we reject the null hypothesis—confirm the experimental hypothesis—when the null hypothesis is actually true. We thought we found an experimental effect but there really wasn't one. This is called a *Type I Error*. We find out if we have made this mistake by replicating the experiment under more stringent conditions. On the other hand, if we mistakenly accept the null hypothesis—erroneously disconfirm the experimental hypothesis—it is a *Type II Error*. It's bad for our professional future to make Type I errors publicly. The guys who "found" cold fusion made a Type I error, and where are they now? Sometimes Type II errors are worse. It is bad to say there are no side effects of drugs when they really exist.

It is conventional to reject the null hypothesis if there is no more than one chance in 20 that it is actually true. If the experiment is vitally important we might insist on only allowing one chance in 100. If nobody cares, we might go for one in 10. One cynic suggests that published results represent that 5% of all experiments that corroborate prior expectations.

If there is only a *single treatment* or factor (independent variable), experimental design is easy. The values of factors are *treatment levels*. Randomly selected treatment levels can be generalized to any treatment level within the range. Results from arbitrarily selected treatment levels are technically applicable only to those specific levels, although we might go ahead and generalize anyway. In our experiment, the factor was the prior experience of being read to, and there are two levels: was read to, or was not. So we test both groups and see if we can reject the null hypothesis. Instead of just randomly choosing members of the two groups, we could match group members on some important variables, like race or socioeconomic status. That helps control for nuisance variables. We still have to randomly choose the pools from which matched subjects can be drawn. This is called a *block* design, and can be more powerful that the simple design. Sometimes we can use the same subjects or material objects for all treatment levels; this is a *repeated measures* design, and is stronger yet.

A single factor experiment is not always best. Suppose we also want to investigate testing conditions. Let's say we want to see the effect of testing in a hot, stuffy room vs. testing in cool, fresh air. We could test each factor separately, but that would not allow us to see if there is an *interaction* between factors; maybe room conditions have less effect on kids who have been read to. We can set up a matrix of four groups: read to/stuffy, read to/fresh, not read to/stuffy, not read to/fresh. All subjects are randomly selected, of course. This is a *two-factor factorial* design. In a *completely randomized factorial* design, each group gets only one combination of treatment levels. If there are p levels of one factor and q levels of another and n subjects in each group, we need pqn subjects. The statistics get a little hairier with two or more factors, but the increased knowledge is usually worth it. There is no real limit on the number of factors, but be prepared for problems if you go much above three. With four factors, each with five levels, and 50 subjects per group, you would need 1,000 subjects!

We isolate the sources of variance: variance within experimental groups, variance associated with factors, and variance related to interactions. If the variance associated with factors is big compared to the variance within groups, we will not reject the null hypothesis; we will say that the experimental hypothesis has been provisionally confirmed. How big is "big enough" is beyond the scope of this essay. We also need to look at the mean values of the dependent variable for each treatment level. Maybe the null hypothesis can be rejected overall, but differences between some treatment levels are not significant.

We can make the design more powerful by matching subjects for nuisance variables in a *block factorial design*. Sometimes it is possible to use the same subjects or objects across one factor, but not across another. For example, we might want to determine the effects of two different reading tests. The same kids can take Test A and Test B, but obviously the "read to" and "not read to" conditions will use different kids. This is called a *split-plot factorial* design. It can be more economical of subjects than a randomized factorial and a little easier to set up than a block factorial. You need to be sure that taking the first test will not affect the second test.

Here are some examples using actual data for 4th grade reading and science scores in 2001 and 2002. One treatment is "subject," with two levels, and the other treatment is "year," also with two levels. For the completely randomized factorial we randomly choose 10 APS schools for each treatment combination. We will not be using the same schools for each subject and year. You see that there is almost no relationship across rows, and the results are that there is no significant difference by subjects or years. Actually, if we had used 100 schools, we would have found a significant difference by years. Ten schools are nowhere near enough.

If we use a block factorial, the schools are randomly selected, but the same schools are used for both subjects and both years. Now there is an obvious relationship across rows; a school with a high score in reading generally has a high score in science in both years. For this example there is a significant relationship by years, but not by subjects. There is no interaction between subjects and years. If we had kept the same schools for both subjects, but used a different set of schools for each year, we would have had a split-plot factorial design.

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Table of Completely Randomized Factorial Data

2001		2002	
READING	**SCIENCE**	**READING**	**SCIENCE**
67.4	46.1	54.7	42.7
56.9	55.8	57.2	45.6
38.1	46.3	42.8	50.9
45.1	40.6	64.1	58.0
47.4	61.3	58.9	57.7
62.2	44.8	47.9	38.3
60.9	55.3	57.8	55.1
72.8	44.0	48.8	40.2
58.3	62.2	54.7	39.6
56.9	64.1	46.6	61.6

Table of Block Factorial Data

2001		2002	
READING	SCIENCE	READING	SCIENCE
67.4	70.8	61.7	61.6
56.9	54.2	40.8	39.4
38.1	33.9	42.4	38.3
45.1	40.6	43.7	42.9
47.4	40.5	41.0	37.5
62.2	65.5	64.1	63.4
60.9	61.5	52.9	50.2
72.8	69.3	66.0	65.1
58.3	62.2	48.8	53.3
56.9	53.7	46.6	43.8

There is a large set of experimental designs, and we have only looked at a few. Each has specific advantages under specific conditions. Each has its own problems. I haven't even mentioned the many controlling assumptions like normality, independence, and homogeneity of variance. If you plan to go beyond the simplest design, and have not had a rigorous graduate-level course in the subject or a lot of experience, get help! This is not something to review at home between TV programs. The math is conceptually simple, but mind-destroying in practice. I can provide details if anyone wants them. There is software available, but watch out! Even experts have gone astray on canned software.

Walt Murfin
CESE Statistician

STAND AND DELIVER—Revisited. *The rest of the story—by Jerry Jesness*

Thanks to the popular 1988 movie *Stand and Deliver*, many Americans know of the success that Jaime Escalante and his students enjoyed at Garfield High School in East Los Angeles. During the 1980s, that exceptional teacher at a poor public school built a calculus program rivaled by only a handful of exclusive academies.

It is less well-known that Escalante left Garfield after problems with colleagues and administrators, and that his calculus program withered in his absence. That untold story highlights much that is wrong with public schooling in the United States and offers some valuable insights into the workings—and failings—of our education system.

Escalante's students surprised the nation in 1982, when 18 of them passed the Advanced Placement calculus exam. The Educational Testing Service found the scores suspect and asked 14 of the passing students to take the test again. Twelve agreed to do so (the other two decided they didn't need the credit for college), and all 12 did well enough to have their scores reinstated.

In the ensuing years, Escalante's calculus program grew phenomenally. . . .

By 1990, Escalante's math enrichment program involved over 400 students in classes ranging from beginning algebra to advanced calculus. . . .

In 1991 Escalante decided to leave Garfield. All his fellow math enrichment teachers soon left as well. By 1996, the dynasty was not even a minor fiefdom. Only seven students passed the regular ("AB") test that year, with four passing the BC exam — 11 students total, down from a high of 85.

In any field but education, the combination of such a dramatic rise and such a precipitous fall would have invited analysis. If a team begins losing after a coach is replaced, sports fans are outraged. The decline of Garfield's math program, however, went largely unnoticed.

Movie Magic

Most of us, educators included, learned what we know of Escalante's experience from

Stand and Deliver. For more than a decade it has been a staple in high school classes, college education classes, and faculty workshops. Unfortunately, too many students and teachers learned the wrong lesson from the movie.

Escalante tells me the film was 90 percent truth and 10 percent drama—but what a difference 10 percent can make. *Stand and Deliver* shows a group of poorly prepared, undisciplined young people who were initially struggling with fractions yet managed to move from basic math to calculus in just a year. The reality was far different. It took 10 years to bring Escalante's program to peak success. He didn't even teach his first calculus course until he had been at Garfield for several years. His basic math students from his early years were not the same students who later passed the A.P. calculus test. . . . .

It was not until his fifth year at Garfield that he tried to teach calculus. . . . in the hope that the existence of an A.P. calculus course would create the leverage necessary to improve lower-level math classes.

His plan worked. . . . In 1979 he had only five calculus students, two of whom passed the A.P. test. (Escalante had to do some bureaucratic sleight of hand to be allowed to teach such a tiny class.) The second year, he had nine calculus students, seven of whom passed the test. A year later, 15 students took the class, and all but one passed. The year after that, 1982, was the year of the events depicted in *Stand and Deliver*.

The *Stand and Deliver* message, that the touch of a master could bring unmotivated students from arithmetic to calculus in a single year, was preached in schools throughout the nation. While the film did a great service to education by showing what students from disadvantaged backgrounds can achieve in demanding classes, the Hollywood fiction had at least one negative side effect. By showing students moving from fractions to calculus in a single year, it gave the false impression that students can neglect their studies for several years and then be redeemed by a few months of hard work.

This Hollywood message had a pernicious effect on teacher training. The lessons of Escalante's patience and hard work in building his program, especially his attention to the classes that fed into calculus, were largely ignored in the faculty workshops and college education classes that routinely showed *Stand and Deliver* to their students. To the pedagogues, how Escalante succeeded mattered less than the mere fact that he succeeded. They were happy to cheer Escalante the icon; they were less interested in learning from Escalante the teacher. They were like physicians getting excited about a colleague who can cure cancer without wanting to know how to replicate the cure.

The Secrets to His Success

How did Escalante attain such success at Garfield? One key factor was the support of his principal, Henry Gradillas.

Escalante's program was already in place when Gradillas came to Garfield, but the new principal's support allowed it to run smoothly. In the early years, Escalante had met with some resistance from the school administration. One assistant principal threatened to have him dismissed, on the grounds that he was coming in too early (a janitor had complained), keeping students too late, and raising funds without permission. Gradillas, on the other hand, handed Escalante the keys to the school and gave him full control of his program.

. . .

In the process of raising academic standards at Garfield, Gradillas made more than a few enemies. He took sabbatical leave to finish his doctorate in 1987, hoping that upon his return he would either be reinstated as principal of Garfield or be given a position from which he could help other schools foster programs like Escalante's. He was instead assigned to supervise asbestos removal. It is probably no coincidence that A.P. calculus scores at Garfield peaked in 1987, Gradillas' last year there.

Escalante remained at Garfield for four years after Gradillas' departure. Although he does not blame the ensuing administration for his own departure from the school, Escalante observes that Gradillas was an academic principal, while his replacement was more interested in other things, such as football and the marching band.

Gradillas was not the only reason for Escalante's success, of course. Other factors included:

The Pipeline. Unlike the students in the movie, the real

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Garfield students required years of solid preparation before they could take calculus. This created a problem for Escalante. Garfield was a three-year high school, and the junior high schools that fed it offered only basic math. Even if the entering sophomores took advanced math every year, there was not enough time in their schedules to take geometry, algebra II, math analysis, trigonometry, and calculus.

So Escalante established a program at East Los Angeles College where students could take these classes in intensive seven-week summer sessions. Escalante and Gradillas were also instrumental in getting the feeder schools to offer algebra in the eighth and ninth grades. . . .

By the time he left, there were nine Garfield teachers working in his math enrichment program and several teachers from other East L.A. high schools working in the summer program at the college.

Tutoring. . . .Among the parents of Garfield students, high school graduates were in the minority and college graduates were a rarity. To help make up for the lack of academic support available at home, Escalante established tutoring sessions before and after school. When funds became available, he arranged for paid student tutors to help those who fell behind. . . .

By 1987, in A.P. calculus. . . Garfield had outpaced Beverly High.

Open Enrollment. Escalante did not approve of programs for the gifted, academic tracking, or even qualifying examinations. If students wanted to take his classes, he let them.

His open-door policy bore fruit. Students who would never have been selected for honors classes or programs for the gifted chose to enroll in Escalante's math enrichment classes and succeeded there.

Of course, not all of Escalante's students earned fives (the highest score) on their A.P. calculus exams, and not all went on to receive scholarships from top universities. One argument that educrats make against programs like Escalante's is that they are elitist and benefit only a select few.

Conventional pedagogical wisdom holds that the poor, the disadvantaged, and the "culturally different" are a fragile lot, and that the academic rigor usually found only in elite suburban or private schools would frustrate them, crushing their self-esteem. The teachers and administrators that I interviewed did not find this to be true of Garfield students.

Wayne Bishop, a professor of mathematics and computer science at California State University at Los Angeles, notes that Escalante's top students generally did not attend Cal State. Those who scored fours and fives on the A.P. calculus tests were at schools like MIT, Harvard, Yale, Berkeley, USC, and UCLA. For the most part, Escalante grads who went to Cal State-L.A. were those who scored ones and twos, with an occasional three, or those who worked hard in algebra and geometry in the hope of getting into calculus class but fell short.

Bishop observes that these students usually required no remedial math, and that many of them became top students at the college. . . .

Death of a Dynasty

Escalante's open admission policy, a major reason for his success, also paved the way for his departure. Calculus grew so popular at Garfield that classes grew beyond the 35-student limit set by the union contract. Some had more than 50 students.. . . the teachers union complained about Garfield's class sizes. Rather than compromise, Escalante moved on.

Other problems had been brewing as well. After *Stand and Deliver* was released, Escalante became an overnight celebrity. Teachers and other interested observers asked to sit in on his classes, and he received visits from political leaders and celebrities. . . This attention aroused feelings of jealousy. In his last few years at Garfield, Escalante even received threats and hate mail. In 1990 he lost the math department chairmanship, the position that had enabled him to direct the pipeline. . . .

Scattered Legacy

When Cal State's Wayne Bishop called Garfield to ask about the status of the school's post-Escalante A.P. calculus program, he was told, "We were doing fine before Mr. Escalante left, and we're doing fine after." Soon Garfield discovered how

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critical Escalante's presence had been. Within a few years, Garfield experienced a sevenfold drop in the number of A.P. calculus students passing their exams. (That said, A.P. participation at Garfield is still much, much higher than at most similar schools. In May of 2000, 722 Garfield students took Advanced Placement tests, and 44 percent passed.)

Escalante moved north to Sacramento, where he taught math, including one section of calculus, at Hiram Johnson High School. He calls his experience there a partial success. In 1991, the year before he began, only six Johnson students took the A.P. calculus exam, all of whom passed. Three years later, the number passing was up to 18—a respectable improvement, but no dynasty. It had taken Escalante over a decade to build Garfield's program. Already in his 60s when he made his move, he did not have a decade to build another powerhouse in new territory. . . .

And after withering in the absence of its founder, the Escalante program at East Los Angeles College has revived. Program administrator Paul Powers reports that over 1,000 high school students took accelerated math classes through the college in the year 2000. . . .

Nationally, there is no denying that the Escalante experience was a factor in the growth of Advanced Placement courses during the last decade and a half. The number of schools that offer A.P. classes has more than doubled since 1983, and the number of A.P. tests taken has increased almost sixfold. This is a far cry from the Zeitgeist of two decades ago, when A.P. was considered appropriate only for students in elite private and wealthy suburban public schools.

Still, there is no inner-city school anywhere in the United States with a calculus program anything like Escalante's in the '80s. A very successful program rapidly collapsed, leaving only fragments behind.

This leaves would-be school reformers with a set of uncomfortable questions. Why couldn't Escalante run his classes in peace? Why were administrators allowed to get in his way? Why was the union imposing its "help" on someone who hadn't requested it? Could Escalante's program have been saved if, as Gradillas now muses, Garfield had become a charter school? What is wrong with a system that values working well with others more highly than effectiveness?

Barn Building

Lyndon Johnson said it takes a master carpenter to build a barn, but any jackass can kick one down. In retrospect, it's fortunate that Escalante's program survived as long as it did. . . .

Gradillas has an explanation for the decline of A.P. calculus at Garfield: Escalante and Villavicencio were not allowed to run the program they had created on their own terms. In his phrase, the teachers no longer "owned" their program. He's speaking metaphorically, but there's something to be said for taking him literally.

In the real world, those who provide a service can usually find a way to get it to those who want it, even if their current employer disapproves. If someone feels that he can build a better mousetrap than his employer wants to make, he can find a way to make it, market it, and perhaps put his former boss out of business. Public school teachers lack that option.

There are very few ways to compete for education dollars without being part of the government school system. If that system is inflexible, sooner or later even excellent programs will run into obstacles.

Escalante has retired to his native Bolivia. He is living in his wife's hometown and teaching part time at the local university. He returns to the United States frequently to visit his children. When I spoke to him he was entertaining the possibility of acting as an adviser to the Bush administration. Given what he achieved, he clearly has valuable advice to give. . . .

Jerry Jesness is a special education teacher in Texas' Lower Rio Grande Valley.

Please view:
http://reason.com/0207/fe.jj.stand.shtml
to read entire article (without elipses).

Note: Escalante visited Albuquerque's Rio Grande High School October 22, and met with teachers and students.

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CESE Making a Difference

Diary of a slightly busier-than-usual period for Marshall Berman, founder and first president of CESE.

Oct 22: Governance-to-Governance Education meeting (Indian Tribal Leaders, State Board and State Dept. of Education) in Gallup

Oct 23: Governance-to-Governance meeting and Legislative Education Study Committee (LESC) meetings in Gallup

Oct 30 – Nov 1: State Board of Education committee meetings followed by meeting of full board (on average, 10-hour days in Santa Fe)

Nov 2: Meeting of State Dept. of Education science standards writing team (along with CESE members Malva Knoll, Art Edwards, Len Duda, Jennifer Huntsberger, et al.)

Nov 14: Keynote speaker at Albuquerque Partnership Education Forum.

Nov 16: As president of New Mexico Academy of Science, presided over day-long Centennial Conference, evening banquet, and presentation by Professor Ken Miller of Brown University.

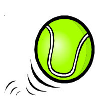
Nov 18: Presentation to Albuquerque Business Education Compact.

Nov 20 – 22: State Board of Education committee meetings followed by meeting of full board (more 10-hour days).

Nov 23: Collapse ;-)

NOTICES

BOUNCING E-MAIL



Please notify Marilyn at **<mmkring@juno.com>** if you change your e-mail address. A lot of email has been bouncing lately.

DUES

Please check your label for expiration date. Details for membership are at the bottom of page 2. (Read the fine print.) Discrepancies on due date? Call Jerry Shelton at 296-1467.