



The **BEACON**

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TERRA INCOGNITA

As I am writing this, a plume of ash and death still rises from the ruins of the World Trade Center. At the moment, we do not even know how many people were killed, much less what the event means, how it will change our lives and our world, what its impact will be on the history of our time.

At moments like these, the mind spontaneously reaches back to try to find past events or situations to compare to the current crisis; we often use historical precedents to try to understand the present. But as a historian, I can tell you that analysis by analogy can be very dangerous, and can easily obscure more than it illuminates. For example, the historical analogy of choice so far has been the attack on Pearl Harbor. Many media commentators, and not a few political leaders, have compared our terrible September 11th to that fateful December 7th, and have concluded that they are similar dates which live in infamy. By extrapolation, therefore, we are now in a state of war and must once again prepare to answer the trumpet's summons.

But a moment's critical examination reveals that the analogy breaks down after the first step or two. The attack on the fleet at Pearl Harbor was a military action by a clearly-identified nation against an unambiguous military target; when the dust settled, it was quite obvious what the United States had to do, and even pretty clear what would be required to do it. Not one of these characteristics pertains to the terrorist attacks this week. Whatever happens next will not be

like World War II. We simply cannot rely on historical analogies to steer a course for us into the future.

The much more daunting truth is that we have now entered uncharted territory. We are all going to have to grope and stumble our way along, making up the rules as we go; we may be in it for another long, twilight struggle. The journey will require careful, critical, well-informed thought, and a considerable amount of creativity and sensitivity—all goals of the CESE. The purpose of our organization remains the same—to promote the best education possible for our children—but the stakes are now higher than I'd wager any of us ever imagined. Now more than ever, we must be able to think clearly about the promises and perils of living in a complex society shaped greatly by science and technology.

The good news is that we are a resourceful, ingenious, compassionate people, with strengths that derive from unity of purpose and diversity of perspective. While the burden that has fallen to us may be heavy, I think we have just the backs to bear it.

Timothy Moy
CESE President



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MEETING WITH THE ALBUQUERQUE BUSINESS EDUCATION COMPACT

On August 20, I gave a presentation to the Albuquerque Business Education Compact (ABEC <<http://abec.unm.edu/>>) entitled "Data-Based Decision Making in Education." Jerry Shelton arranged the presentation in a previous meeting with ABEC Chairman, Sherman McCorkle.

The talk briefly described CESE and its mission. I discussed the CESE White Paper, addressing the disparity in student achievement among New Mexico's districts (the bimodal curves), state-level education governance systems, and early childhood education, including the most recent APS pre-school research results of CESE member Prof. Richard Boyle.

I also provided a chart on 1999-2000 test score growth for many of New Mexico's schools. The State Board's accountability system may indeed have already encouraged some self-examination in many schools, with resulting increases in student achievement. However, the Board's accountability program is in its early stages, and is evolving rapidly to improve fairness, accuracy, and impact.

The adoption of Baldrige quality principles is also beginning to deliver results, both at the State Dept. and State Board levels, and at the school level with SQS (Strengthening Quality in Schools). This transition to quality thinking will not be easy, quick, or universally accepted. However, progress is being made.

I asked for ABEC help in: getting more informed; reducing the overly critical rhetoric, or at least ensuring that criticisms are valid and based on reality; and providing the unique help that only the business community can deliver.

CESE was invited back to discuss more of the State Board's progress in the area of academic standards development.

—Marshall Berman

Note: Marshall's lame excuse for nonattendance at the last Board meeting was a four-day hospitalization for back surgery. He is now happily at home, on the mend, and back in operation.—**Ed**

BOARD MEETING MINUTES

Meeting convened at 6 p.m. at Quasar International. Board members present:

Tim Moy, Jon Weiss, Steve Brugge, Kim Johnson, Dave Thomas, Jerry Shelton, Bill MacPherson, Marilyn Savitt-Kring. CESE member Art Edwards sat in for discussion of the "Shape of Life" presentation upcoming in February.

Jerry reporting for Nancy said we have \$1,660.95 in our treasury.

Jerry also gave us handouts from subduck Jack Jekowski, titled "Math, Science and Technology Initiative Resource Partnership Matrix," which shows business, educational and non-profit organizations working toward improved education in New Mexico (CESE is included). The handout shows contact information, missions, activities, etc.

Deadline for submissions for the December Beacon is November 15th. Please send short articles in Word to njshelton@qwest.net.

Steve mentioned that the Albuquerque Tribune (8/29/01) ran an article on their Insight and Opinion page titled, Math and Science: Charting a Course for Excellence, written by subduck Jack Jekowski.

CESE will have a table at the annual Natural History Museum's open house on October 3rd. Marilyn read a recently received e-mail (posted later to the subducks in a separate message) from David Applegate, Director of Government Affairs & Editor, Geotimes, of the American Geological Institute, on the latest situation concerning the education bill and the Santorum amendment. Congress had been on recess till after Labor Day.

Marilyn said our new list serve through Dave Johnson at New Mexico Tech is up and running so that we can again simultaneously contact all of the ducks who have e-mail. She also asked that one other board member besides herself be able to post to this list. Kim Johnson volunteered. It will work as before. If anyone wants to post a message to ALL of the ducks, please contact Marilyn at mmkring@juno.com or Kim

at kandjj@home.com and we can forward the message to all of the ducks. Since many of these CESE members don't want to receive much e-mail, we limit these posts to the most important issues concerning science-math education and related topics.

Jon suggested that we might connect with Jim Walther, director of the National Atomic Museum on how CESE might help.

Kim, accompanied by Bill and Jerry, recently met with U.S. Representative Heather Wilson and presented addenda to the previously submitted CESE white paper to her. They asked that she let CESE be her source of data. Kim would also like to set up similar meetings with our other Congressional delegates.

Dave and Art are organizing a video presentation by Mark Shelly on evolution called the Shape of Life to be held next February at the Natural History Museum. Details are still being worked out including possible sponsors in addition to CESE and NMSR such as PBS or the Albuquerque Journal.

Tim showed us a copy of the current *Skeptical Inquirer* with his name listed on the cover along with authors such as Arthur C. Clarke.

Tim adjourned the meeting at 8 p.m.

Respectfully submitted,

Marilyn Savitt-Kring

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Note:

If you have changed e-mail addresses, please let Marilyn know at mmkring@juno.com

TEST ENGINEERING

Organizations like NAEP or McGraw-Hill don't make up tests blindly. Teachers also ought to have some idea about good testing. Parents ought to know something about tests when their kids come home complaining about the terrible test the mean teacher gave them.

On an essay type question you would like the best kids to do superbly, maybe half to get it fairly well, and some not to get it at all. You want the smartest kids to do very well on true/false questions, the average kids to get many, but not all, and the ones who haven't a clue to do no better than chance. You want the smartest kids to pick the correct answer on multiple-choice questions. You want each distractor on multiple-choice items to have a reasonable chance of being picked by those who don't know the answer. You certainly don't want any distractor to get chosen more often than the correct answer.

Testing organizations use "Item Response Theory" to hone their tests to a fine edge. This is best explained by considering multiple-choice questions, but is applicable, with modifications, to any type. First, you have to make up a test; you can't improve a test until you have one. You probably have some very smart experts doing this. Maybe the experts go over all the questions and are able to toss out some *a priori*. When the test is ready, you give it to a representative sample. Next you have to grade each person's test.

Now you know which kids did well and which did poorly on this preliminary test. Let's call the half who did best the "upper" group, and the half who did poorly the "lower" group. And let's say there are N in each group, hence $2N$ total. We look at each item, and count those in both groups who got it correct, N_c . Divide that number by the total number taking the test ($2N$), and call it $P=N_c/2N$, the "**index of difficulty**." A high index indicates an easy question, and *vice versa*. Count the number who got it right in the upper group, N_u , and in the lower group, N_l . Now get the proportion of each group who got it right: $P_u=N_u/N$, and $P_l=N_l/N$. For each item, subtract P_l from P_u to give D , the "**index of discrimination**." You want the difficulty index to be about 0.5, but you will also want some questions to be easier so that even the slower students will get them, and some more difficult so that only the best students will get them.

However, you don't want questions so hard that almost no one gets the answer, or so easy that everyone does. So you cut any questions for which the index of difficulty is very much higher or lower than 0.5 and you try to get an average of close to 0.5 overall. You would like the index of discrimination to be fairly high; there should certainly be more smart kids who get any question right. Drop any questions having a low index of discrimination, because you want every question to discriminate between those who have studied and those who haven't. If you want to wind up with 100

items, you need to start with many more.

Now you need to look at each of the possible choices for each of the questions. (Remember that we're only looking at multiple-choice questions for the present.) Did at least some people choose each of the distractors—preferably about equal numbers for each? Was any distractor preferred to the correct answer?

Almost certainly, many items will have to be revised or deleted. If the upper group didn't get what you thought was the correct answer, it may be ambiguous or too hard. If nobody picked one of the distractors, it was too obviously false. If too many chose one of the distractors, it looks too much like a correct answer. If too many in the lower group chose the correct answer, it was too easy. If some questions are similar in content, you keep the one with an index of difficulty close to 0.5 and a high index of discrimination.

A riterion-related test is intended to determine who can meet some external criterion: success in college, in a profession, etc. It is not the same as a riterion-referenced test (CRT), which is intended to determine who is familiar with criteria such as state-mandated standards. If this is a riterion-related test you need to know how each item correlates with the external criterion. Every item need not have a very high correlation, but you will want to get rid of any that are negatively correlated. That is, you don't want

Continued from page 4

to keep any items which, if answered correctly, seem to accompany not meeting the criterion. This correlation of items with the criterion is the “**validity index**”, and is still another thing that might mean cutting some questions.

Now, with a refurbished test, you have to give it all over again to a different group and go through the whole procedure again. It should be obvious that this is not a paper and pencil exercise if you have a big test being given to a large sample. There is software for doing all the mind-destroying arithmetic.

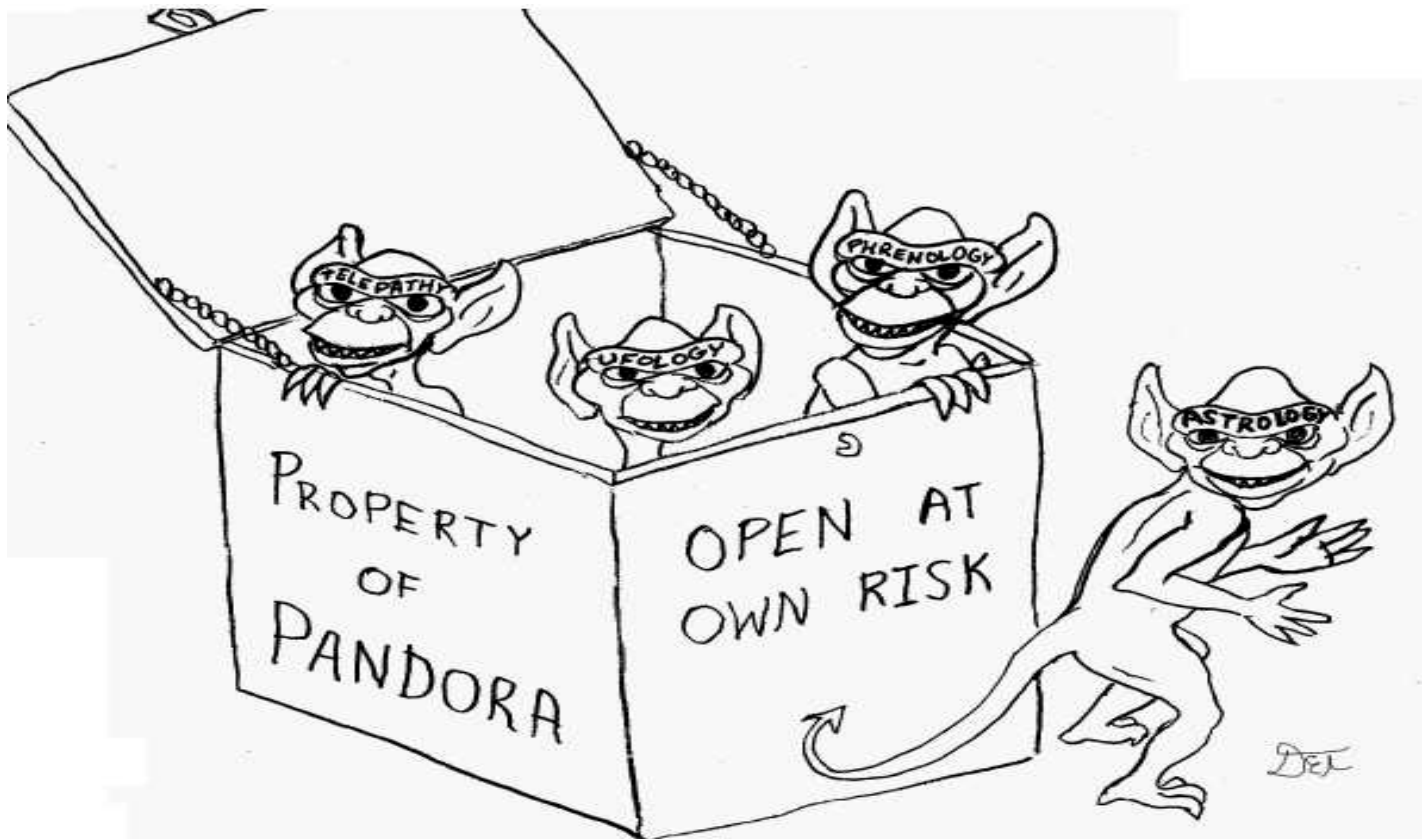
You might hear that the procedure will not work for essay type

questions. That is not true. It is more involved, requires more human intervention, and standard software is not as useful. However, the same principle applies. More thinkers than nonthinkers should get correct answers. You don't want any item to be either too easy or too difficult, and you want to get rid of ambiguous questions. Some sources say that the method cannot be used with a criterion-referenced test. That is also not true. Item Response Theory is still useful for a CRT. Although there are differences, the general idea is the same. The items themselves might be different; all must be related to the criterion or standard. However, IRT can help determine

which items are ambiguous or poorly phrased, which items best discriminate for knowledge of the criteria, and which items are too hard or too easy.

Teachers, you can use this method yourselves. You could use the first-cut test in year one, and rework it for year two, and again for subsequent years. You probably won't have so many questions in any test that hand calculation is impossible. All it takes is a calculator, several sheets of multi-column paper, lots of free time, a sharp pencil with a very good eraser, and mountains of motivation.

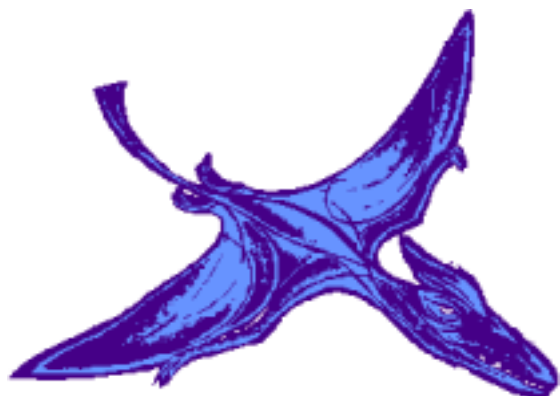
Walt Murfin



*The Accrediting Commission of Career Schools and Colleges of Technology (ACCSCT) gives Official Accreditation to The Astrological Institute of Scottsdale, Arizona , August 2001... **Toon by Thomas***

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OUR MISSION

The events of the last few weeks remind us of CESE’s mission “to ensure that the beacon of the Enlightenment is not extinguished in 21st century America.” The 20th century saw the forces of darkness attempt to extinguish that beacon with force, murder, torture, propaganda, and mindless obedience. Their enemies were educated people capable of thinking critically, and highly desirous of personal freedom. They wanted automatons, incapable of reasoning beyond simple slogans and screaming epithets. Their motivating emotion was hatred. These people still inhabit the world, and it matters not whether their hatred is inspired by fanatical politics or fanatical religion.

Eternal vigilance is still the price of liberty. And ignorance is still the enemy. It is again time for this generation to act in defense of freedom, to educate all our children, and to stand strong against the forces of darkness.

Marshall Berman

