

**Legislative Intent Behind
Scientifically Based Research Imperatives**

No Child Left Behind
P.L.107-110

June 21, 2002

Prepared by

Robert W. Sweet, Jr.
Professional Staff Member
Committee on Education and the Workforce
U.S. House of Representatives
Washington, DC 20215

Scientifically Based Research A Short Legislative History

Part I

Comparing medical research with education research.

- American Medical Association formed to standardize medical practice in 1847.
- Food and Drug Administration established in 1931 to scientifically test foods and drugs, and disseminate legal advice to prevent violations and to police medical devices.
- Examples of “medical practices” that have not proven effective: Reich’s Orgone Energy Accumulator; Magnetic Insoles; Electric Belts; Radium/Uranium treatment; Phrenology; the Psycograph; the Fitness Machine. [Source: QUACK! Tales of Medical Fraud from the Museum of Questionable Medical Devices, by Bob McCoy, Santa Monica Press, 2000]
 - The Orgone Energy Accumulator was developed in 1940. According to Reich’s theory Orgone falls to earth from outer space but is only partially detectable through conventional laws of physics – which perhaps explains why no physicist had ever heard of it. He believed that absorbing large quantities of it would make a person healthier. In 1954 the FDA ordered Reich to stop shipping the Accumulators. He died in prison in 1957, but that did not put a stop to Orgone. A group of followers who remained dedicated to

Reich's ideas started a journal about Orgone energy in 1967, and founded the American College of Oregonomy in Manhattan the following year. In 1987, the college relocated to Princeton, New Jersey. Orgone energy is also useful against flying saucers in case you have such a need.

- Electric Belts were so popular at the turn of the twentieth century that the Sears catalogue featured them in five sizes. Sears favored the Heidelberg Alternating Current Medical Electric Belts that, of course, contained no alternating current. The Dr. Bell Electro Appliance attached dry cell batteries to a girdle and allowed the user to adjust the amount of current. Despite their use of the dry cell batteries, the later electric belts were as ineffective as cure-alls as those of the 1880's.
- As the 20th Century began, radium was regarded as almost supernatural because of its radioactive, transformative and healing powers. Radium began appearing everywhere. In bath salts, cold creams, mouth washes, ointments, face powders, healing pads, eye washes, belts, crocks, coins, and bags. AMA criticism of radium quackery was not that the products were radioactive, but that the quackery contained too little radioactivity to be effective: Some doctors also prescribed radium water, gave radium injections, or applied radium topically.
- Phrenology was a popular "pseudo-science throughout the 19th Century. Phrenologists felt the head shape of their patients to gauge their "moral constitution" and then prescribed a dose of practical advice on top of it.

- Massage that fat away has been a dream for centuries. In 1857, Swedish Dr. Gustav Zander invented a mechanical device to mimic actual exercise, including bicycling and rowing. U.S. Hospitals added “Zander rooms,” which were later closed when the machines produced no therapeutic effect. In 1996 the “Model EE-400 was called the Executive Briefcase Model to provide “easy fitness for men.” In 1999 FDA investigators accompanied the U.S. Marshall to the offices of Executive Fitness Products in Atlanta, GA to assist in the seizure of hundreds of these devices with an estimated retail value of \$200,000. The devices were ordered destroyed.
- “Specializing is the modern tendency in medical practice. Hence the quack, who is an exaggerated and grotesque imitation of the regular practitioner, smells money in devoting himself to specific fields of endeavor. Sedulously [diligently] he perfects himself in his own department; not by acquiring knowledge of the nature and treatment of diseases, indeed, but by studying how most effectively to enmesh the sufferer from a certain class of ailments in the net of his specious promises.” [Samuel Hopkins Adams – Colliers Magazine, September 1, 1906.]
- Educating children and “training their brains” is complex, but so is development of treatments for cancer, or doing heart replacements, or preparing medicines that are safe and effective. We must have valid evidence to support educational endeavors. Educational Quackery is rampant in our schools today, and there is no AMA or FDA to stop

it. The requirement of Scientifically Based Research may stimulate such developments in the private sector, or if a vacuum persists, a governmental entity to provide the public with information about safe practices in our schools.

Part II Chronology of SBR

- Beginning in January 1995, the Committee on Economic and Educational Opportunities conducted a series of Congressional Hearings to determine what works in education reform, and if federal education programs were delivering results;
- By 1999, there had been 22 Hearings, 26 school districts had been visited, and 237 witnesses had testified before Congress;
- In October 2000, a report was issued titled: “Education at a Crossroads 2000: The Road to Excellence.”
- The report made the following findings:
 - Federal research and evaluation is inadequate: According to the U.S. General Accounting Office (GAO), “information about the federal education effort is needed by many different decision makers...much of that information, however, is not currently available.” This is because “few evaluations of successful strategies exist, and many of the existing

evaluations lack the methodological rigor needed to determine effectiveness.” (Page viii)

- The research community fails to deliver: According to the National Research Council, “social science research currently provides few definitive answers about how to improve educational outcomes for ‘disadvantaged’ children.” A RAND education study found that “the research and development community in education has been unable to provide consensus results or pilot tested policies and practices that could guide policy makers and educators to more effective practices.” (p.viii)
- In 1997 the Congress began work on a reading initiative, The Reading Excellence Act, that was signed into law after bipartisan agreement in 1998 by President Clinton;
- Included in REA was the definition of Scientifically Based Research. Agreement was reached on this definition after many months of discussion with leading researchers all across America.
- Here is that definition: [put on screen];
- Members of Congress, both House and Senate, recognized that after more than 30 years of federal funding of education, the results were not good. The gap between poor children and their more affluent peers was nearly as wide as ever.

- Reading and math scores remained flat;
- Reading research had moved ahead of most other disciplines as evidenced by two reports that were released in 1998 and 2000.
 - Preventing Reading Failure in Young Children (National Research Council) 1998;
 - Report of the National Reading Panel – 2000
 - Panel members of both reached consensus on the findings they presented to Congress.
- 1999 – H.R.4875 – The reauthorization of the Office of Education Research and Improvement passed through subcommittee in the House. No action was taken in the Senate. The definition of SRB was included;
- 2000 – The Reading Deficit Elimination Act of 2000 was introduced by Senator Paul Coverdell and Congressman Bill Goodling. SBR was included in this bill. No action was taken.
- 2001 – The National Research Policy and Priorities Board commissioned the National Research Council to prepare a report on “Scientific Inquiry in Education” that was issued in November 2001.
- 1999-2002 – The Committee on Education and the Work Force held a number of hearings on OERI reauthorization, and the role of the federal government in supporting SBR.

- 2001-02 – H.R.1, the No Child Left Behind Act of 2002, reauthorizing elementary and secondary education programs included more than 110 references to SBR, and was signed into law by President Bush in January 2002.
 - SBR was included in the General Provisions of NCLB
 - SBR was included in the Reading First and Early Reading First sections of NCLB
 - Comprehensive School Reform, and all other programs funded under this act are affected
- 2002 – H.R. 3801 the Education Sciences Reform Act passed the House in May 2002 with bipartisan support and included a definition for Scientifically Based Research Standards. No action has been taken in the Senate to date.
- 2002 – The U.S. Department of Education has hosted two seminars on Scientifically Based Research and how it affects federal education programs.

Part III

Summary of the findings of the National Research
Council
November 2001

[See Power Point Presentation]

Part IV

Definition of Scientifically Based Research

General Provisions

No Child Left Behind Act of 2002

P.L.107-110

Definition of Scientifically Based Reading Research

Reading First Improvement Grants

No Child Left Behind Act of 2002

P.L.107-110

Definition of Scientifically Based Research Standards

Education Science Reform Act

H.R.3801

Scientifically Based Research Standards. -- The term "scientifically based research standards" --

A.means the application of rigorous, systemic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs; and

B.includes research that--

- i. employs systematic, empirical methods that draw on observation or experiment;
- ii. involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn;

- iii. relies on measurements or observational methods that provide reliable and valid data across evaluators and observers and across multiple measurements and observations and across studies by the same or different investigators;
- iv. is evaluated using experimental designs in which individuals, entities, programs, or activities are assigned to different conditions and with appropriate controls to evaluate the effects of the condition of interest, through random assignment experiments, or other designs to the extent such designs contain within-condition or across condition controls; and
- v. ensure experimental studies are presented in sufficient detail and clarity to allow for replication, or at a minimum offer the opportunity to build systematically on its findings.
- vi. has been accepted by a peer reviewed journal or approve by a panel of independent experts through a comparably rigorous, objective, scientific review.

Part V

The Case For Evidence Based Research.

- Of 84 program evaluations and studies planned by the Department of Education for fiscal year 2000, just one involved a randomized field trial.
[Source: National Center for Policy Analysis, May 30, 2002]

- 11,000 experimental studies are known in the social sciences, compared to over 250,000 in the medical literature. (The Campbell Collaboration as quoted in the Economist, February 28, 2002.
- Governments require sellers of new medicines to demonstrate the safety and effectiveness of their products. The accepted “gold standard” of evidence is a randomized controlled trial, in which a new drug is compared with the best existing therapy (or with a placebo, if no treatment is available). Drug trials must also include enough patients to make it unlikely that chance alone may determine the result. Economist, February 28, 2002.
- The medical industry is held to a higher standard of evidence than that to which governments hold themselves. This is bad, because, as Carol Fitz-Gibbon, a Campbell Collaboration participant from Durham University, in England, points out, school education amounts to about 15,000 hours of compulsory treatment.
- A case in point is the “whole-language” approach to reading, which swept much of the English-speaking world beginning in the 1970’s and continues unabated today. Whole-language holds that children learn to read best by absorbing contextual clues from texts, not by breaking individual words into their component parts and reassembling them (a method known as phonetics). Unfortunately, the

educational theorists who pushed the whole-language notion so successfully did not wait for evidence from controlled randomized trials before advancing their claims. Had they done so, they might have concluded, as did an analysis of 52 randomized studies carried out by the National Reading Panel in 2000, that effective reading instruction requires the inclusion of phonics.

- “Real scientists do experiments to test their theories – or, if they cannot, they try to look for natural phenomena that can act in lieu of experiments. Social scientists, it is widely thought, do not subject their own hypotheses to any such rigorous treatment. Worse, they peddle their untested hypotheses to governments, and try to get them turned into policies.” [Economist, February 28, 2002.]

Bipartisan Support for SBR

- “In that landmark reform measure [No Child Left Behind Act], States and school districts are now accountable for providing a quality education to all children. And, the availability of scientifically based research that demonstrates what works and what doesn’t work will be critical in this effort.” Congressman George Miller (D – CA) April 30, 2002

- H.R. 1 mentions scientifically-based research over 110 times as it relates to education programs. In crafting this legislation, [H.R.3801] we paid special attention to making sure that the research conducted by the academy was focused on producing useful findings, that is, teaching methodologies that we could actually put into practice. We need to find programs that are scientifically proven to be effective, in education students who have traditionally been disadvantaged so that they, and their schools, can meet the standards set forth in H.R.1. Congressman Bobby Scott (D – VA) April 30, 2002

- We need to develop a “culture of science” as the National Research Council recommended. That is the intent of the current Assistant Secretary of OERI, Dr. Russ Whitehurst. Passing the Education Sciences Reform Act of 2002 (the reauthorization of OERI) would double the federal funding for education research and would help establish that culture.

- At a hearing on OERI Dr. Whitehurst responded to the following question from Congressman Castle;

Chairman Castle: “I don’t understand why the most basic research practices that take place in other fields – quality research designs, carefully constructed hypotheses, peer-reviewed grants replication – don’t take place in education. It seems to me, in education,

we come up with an idea, they try it in the classroom, and someone says, ‘gee, it really works.’ Then there’s a little pilot thing, there’s a little comparison that is made, and that sort of thing. Are we addressing this problem in this bill or should we address this problem, or is it such a soft science, if you will, as a social science, that you can’t do this?”

Dr. Whitehurst: “I don’t think there is any doubt that we can. If you look within the existing research literature, you will find many instances in which it has been done and it has been done well. But it is, I think, a fact, and the National Research Council has endorsed the view that education has, up until recently, not adopted the procedures of other fields, like medicine or agriculture or even relevant to your comment, social and behavioral fields, like criminal justice and social welfare, in employing the methods of science as a basis for education decision-making. I think that we are close to a point where the right investments, the right structure, and a scientific culture could get us to a tipping point where education moves towards being an evidence based field. I think we are very close to being there.

“If you look at medicine, for example, it’s really only been within the last 75 years that medicine has become an evidence-based field. It was really the development of biochemistry, the science of physiology that allowed medicine to get to the point where it had a basic understanding of disease. Then it was the bringing on board of clinical trials,

(experiments in the field) in 1948, which have skyrocketed now to the point that there are 10,000 of them that allowed medicine to take basic science and determine how it actually worked.

“We can do that in education. We need to do it. This administration, the Secretary and I are committed to seeing that all of our funding, all of our dissemination efforts are based on strong science and are moving toward the goal of having educational decisions based on evidence and science.”

How Will SBR Affect Schooling in America?

- That remains to be seen. The burden of changing the culture is not that of the federal government alone. It will be institutionalized through the actions of university researchers, public policy makers at federal, state, and local levels, textbook publishers, and a determination that the education fads that have affected our schools for centuries will end.
- E.D. Hirsch in a recently published article titled: “Basing Education Policy on Research?” makes the following recommendation:
 - “One of the most useful ways to spend money in education would be to induce the best, most disinterested cognitive scientists to synthesize

what is dependably known about learning in a form that can have direct practical application to schools. A conclusion they will surely reach is one that common sense could have predicted quite apart from research – that because learning is slow and cumulative, we need to translate our knowledge into policies that insure year-to-year coherence in the educational experiences offered to children.

- Everyone is claiming their methods, textbooks and programs are “research based”. Is that really true?
- Recently a group of “Hill staffers” visited two schools in Washington, DC to see first hand some comprehensive school reform models. One school, a charter school, was using the “Expeditionary Learning Outward Bound” program. In the literature that was handed out was the following statement:

“The research-based strategies Expeditionary Learning uses include active learning, constructivist education, project-based instruction, authentic assessment, multiple intelligences, looping, and inclusion.”

- The question I leave you with is this: What evidence is available, and how reliable is it, to support the elements of the Expeditionary

Learning Model above? This is not a trivial question because Expeditionary Learning is being implemented in sixty schools in fifteen localities nationwide.