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AUTHOR Fox, James
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ABSTRACT

Numerous documented examples are presented of how research has contributed to the development of constructive education policies and practices throughout the country. Part 1 discusses the use of research in California, South Carolina, Florida, and Connecticut. Also described are the efforts of specific organizations that are using research to reform education policies. The Education Testing Service is revising the National Teachers Examination; the Education Commission of the States is working to improve secondary schools; and the Carnegie Council on Adolescent Development is influencing the middle grades. Part 2 describes three broad uses of research to influence education policy: (1) the effective schools research; (2) studies of early childhood education; and (3) research on higher order thinking. Also cited are the research-backed education reforms of raising student standards, evaluating teacher quality, and restructuring schools. This section closes by documenting the impact of several major federal research programs as well as studies sponsored through the National Conference of State Legislatures. Part 3 discusses lessons that can be learned about the impact of research on education policy development; describes how research can be most helpful; and makes recommendations for the federal educational research and development system. (169 references) (MLF)

Office of Research

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EXECUTIVE SUMMARY

SPECIFIC USES OF RESEARCH

- **By States**
  - California
    - -- staff development based on federally sponsored "change agent" study
    - -- mentor teacher program based on NIE research on teachers
    - -- teacher credentialing and recruitment based on research on loan forgiveness programs
  - South Carolina
    - -- state-local relations based on governance research
    - -- school improvement councils based on effective schools research
    - -- early childhood education and parents as first teachers based on research on effective prekindergarten programs
  - Florida
    - -- "enabling" legislation based on research on state-local relations
    - -- comprehensive math and science plan based on research on learning theory, organizational development, and implementation of innovations
    - -- school finance reform based on studies of school finance
  - Connecticut
    - -- teacher performance assessments based on studies of teacher knowledge
    - -- training of expert classroom observers based on effective teaching literature
    - -- assessing mathematics achievement based on mathematics education studies

- **By Organizations**
  - Educational Testing Service -- Revamping the National Teachers Examination (NTE)
    - -- NTE now used in 30 states
    - -- in the process of substantial redesign
    - -- redesign heavily based on research about what teachers know and how they think, research on effective teachers and effective schools, and research on classroom management and student assessment
  - The Education Commission of the States -- Improving Secondary Schools
    - -- working in six "relearning" states and fifteen "networking" states to improve secondary schools
    - -- developing a supportive policy environment at both the state and school level
    - -- approach based on ethnographic research on secondary schools and policy research on state-local relations
  - Carnegie Council on Adolescent Development -- Improving the Education of Students in Middle Grades
    - -- report, Turning Points, received wide media attention; more than 40,000 copies distributed, most to local schools
    - -- follow-up planned to help states implement recommendations
    - -- report synthesized a broad range of research ranging from studies of adolescent development to research on teaching and learning to studies of school organization
- **Specific Programs**
  - Classroom Management in Arkansas
    - -- workshop for 10,000 teachers, 70 percent of state's school principals, and representatives from 60 percent of school districts
    - -- evaluations suggest that approach raises student achievement
    - -- work based on research on effective schools and implementing change

- o Comer's School Development Program
  - -- for low achieving, high-risk students
    - o based on bonding students to schools
    - o uses governance structure of principal, parents, teachers, and mental health specialist
    - o combines academic instruction with developing social skills
  - -- students demonstrated marked improvement in achievement, attendance, and discipline in pilot schools
    - o successfully replicated in Prince Georges, MD and Benton Harbor, MI
    - o introduced in 70 schools across country
  - -- based on research on child development, social psychology, and systems management as well as extensive research and development by Comer in New Haven schools

- o Teaching Reading in Philadelphia
  - -- Blueprint for Action presented to School Board
  - -- 5,000 copies of work requested by other jurisdictions
  - -- based on research conducted jointly by the Federal Reserve Bank of Philadelphia and the Philadelphia School District
  - -- findings favor kindergarten attendance, small group/whole group combinations, and basal linguistic instruction.

BROAD IMPACTS OF RESEARCH

- o **Influential Research**
  - o Effective Schools Research
    - -- an estimated 58% of all school districts in the country have implemented programs based on the effective schools research
    - -- has influenced major federal legislation (e.g. P.L. 100-297, the Hawkins-Stafford Elementary and Secondary Improvement Amendments of 1988)

-- key elements of effective schools:
  - o strong and effective instructional leadership
  - o focus on basic and higher order skills
  - o expectation that nearly all children can learn
  - o ongoing assessment of student performance and program effectiveness

o Studies on Early Childhood Education

-- significant increases in state activities
  - o by 1989, 31 states were funding prekindergarten programs and/or providing direct contributions to Head Start
  - o "Children's Agenda" declared in OR; "Decade of the Child" in NY
  - o substantial increases in funding prekindergarten programs in VT, FL, MI, IL
-- major federal initiatives
  - o Smart Start (S. 123/H.R. 1234)
  - o Child Development and Education Act (H.R. 3 -- the Hawkins bill)
  - o Administration proposal to expand Head Start
-- parent education included in one-third of the states
  - o MO parents as teachers program implemented statewide
  - o KY PACE (Parents and Child Education)
    - -- in all KY districts where at least 50% of all adults lack a high school education
    - -- parents attend school along with their 3- or 4-year old children
    - -- parents teach children and take adult education and parenting classes
    - -- Seventy percent of enrolled adults earned GED or substantially increased achievement test scores, and program preschoolers performed better in school than their peers who were not in the program

- -- research influenced programs
  - o Perry Preschool study demonstrated 7:1 benefit-cost ratio
  - o policies are based on research
    - -- linking home environments to school performance
    - -- early childhood development
    - -- the role of the family in the educational process

- o Research on Higher-Order Thinking

  - -- policy and practice
    - o at the Federal level: Summit participants: ". . . citizens must be able to <u>think</u> for a living"
    - o at the state level: California rejected textbooks because not enough emphasis on thinking skills
    - o at the local level: the HOTS program is teaching higher order thinking to more than 9,000 Chapter 1 students in 300 schools in 22 states
      - -- expected to be in more than 600 districts by next year
      - -- students in one school gained 5.6 years on reading test in one year
      - -- 20% of fifth and sixth grade Chapter 1 students in one school tested beyond the high school level
      - -- demonstrates that higher order thinking and basic skills can be taught at the same time
  - -- research
    - o American students do not perform well on even slightly complex tasks
    - o other industrialized countries emphasize depth of curriculum
    - o learning research demonstrates that understanding and basic skills should be taught together
    - o citizens and workers in the 21st century will need new basic skills -- problem solving, analytical reasoning, and critical thinking

- o **Major Reform Initiatives**

  - o Raising Student Standards

    - -- forty-five states modified high school graduation requirements in the 80's

- -- responds to studies calling for more academic curriculum
- -- based on research linking high expectations and curricular exposure to student achievement

o Evaluating Teacher Quality

- -- more than 1,000 pieces of legislation dealing with teacher certification and compensation considered during the 80's
- -- virtually every state enacted policies to reform teacher education and licensing during this period
- -- reforms often in response to research on the quality and quantity of teachers; reforms often based on research

o Restructuring Schools

- -- a few states (AK,ME,MA,WA) have initiated programs to encourage restructuring
- -- pioneering districts have led the way
- -- responds to calls to move more authority and autonomy to the school site level in return for increased accountability
- -- based on research on effective schools and effective businesses

o Federal Research Initiatives

o Becoming a Nation of Readers

- -- based on research conducted by Center for the Study of Reading and Center for the Study of Learning
- -- more than 200,000 copies in circulation
- -- used in state workshops and reprinted by a number of districts
- -- summary brochure sent to more than 80,000 schools and libraries

o Cooperative Learning

- -- based on federally supported research at Johns Hopkins University
- -- reported to be currently in use in more than 30,000 classrooms
- -- students work together
  - o improves academic and cognitive skills
  - o fosters self-esteem

- develops positive attitudes toward school and learning
- breaks down prejudices and stereotypic attitudes

- Legislative Studies

  -- sixty-nine studies in more than 40 states and territories
  -- topics chosen by state legislators
  -- led to reforms
    - AK, KS school finance reform
    - NB early childhood education
    - CA teen pregnancy
    - NC, UT financing special education
    - FL merit schools
    - MN teacher centers
    - TN career ladder
    - VT technology

LESSONS LEARNED

- **The Long and Winding Road**

  - Research Often Enters Classrooms through a Series of Steps

  - Users Know Applications; Often Do Not Know Research Origins

  - Value of Research Often Underestimated

- **Reaching the Potential**

  - New Actors are Making Education Policy

  - Research is Informing Education Policy More than Ever Before

  - Research Is Most Helpful When It

    -- focuses on issues of interest to policymakers at that particular point in time
    -- presents information in a manner that can be readily translated into action
    -- anticipates and overcomes problems that might inhibit its use

RECOMMENDATIONS

- **The Education Research and Development System Must Focus on Issues of National Concern**

- **The Federal Education Research and Development System Must Be Better Coordinated in order to Build a Compelling Knowledge Base**

- **We Must Find Better Ways to Translate Research into Practice**

THE IMPACT OF RESEARCH ON EDUCATION POLICY[1]

Some individuals have claimed that education research has failed to make a substantial impact on education policy or practice. This paper paints a markedly different picture. Rather than asserting personal opinions, it presents numerous documented examples of how research has contributed to the development of substantial, constructive education policies and practices throughout the country. This information should be helpful to members of Congress and others as they assess the value of research relative to other demands that compete for the scarce taxpayer's dollar.

Part I of this paper provides specific examples of how research has contributed to the development of education policies. Here I discuss the use of research in four exemplary states: California, South Carolina, Florida and Connecticut. I also describe the efforts of specific organizations that are using research to reform education policies: the Education Testing Service's refinement of the National Teachers Examination; the National Council of Teachers of Mathematics' efforts to influence mathematics curricula across the country; and the Education Commission of the States' project to improve high schools throughout the nation. This section closes with a discussion of three examples of specific programs that are based on research: the Arkansas Classroom Management Model, a program to improve the education of low achieving high-risk elementary students, and a blueprint for teaching reading in Philadelphia.

Part II describes broad uses of research to influence education policy. Here I identify several major strands of research and demonstrate how they have influenced the development of education policies. The specific examples are the effective schools literature, research on higher order thinking, and studies relating to early childhood education. I also discuss recent prominent education reforms and show how their roots lie in research. Here I examine raising student standards, evaluating teacher quality, and restructuring schools. This section closes by documenting the impact of several major Federal research programs on education policies. Here I discuss work from National Research and Development Centers as well as studies sponsored through the National Conference of State Legislatures.

Part III of this paper discusses lessons that can be learned about the impact of research on education policy development. I offer examples that demonstrate why the value of education research may be underestimated. I close with suggestions for assuring that research is targeted, designed, and disseminated in a manner that will maximize its contribution to the development of constructive and productive education policies.

SPECIFIC USES OF RESEARCH

Presented below are illustrations of the use of research by specific states, by specific organizations, and for the development of specific programs.

SPECIFIC STATES

California

California is widely regarded as a leader in the education reform movement. Linda Bond, senior consultant to California's Senate Education Committee, reports that research played a substantial role in the development of major portions of California's education reform legislation. For example, the staff development sections of California's omnibus education reform act of 1977 (AB551) were drawn virtually verbatim from recommendations in a federally sponsored research report on educational change. (Berman and McGlaughlin 1973) Research conducted at the National Institute of Education by Gary Sykes (1983) was particularly influential in guiding the development of California's pioneering mentor teacher program.

More recently, research commissioned by the Commons Commission has influenced the structure of California legislative proposals on teacher credentialing and recruitment. Based on research, the new bill (SB 148) calls for teachers to be credentialed on the basis of competence, as demonstrated through subject matter examinations and apprenticeships, rather than on the basis of seatwork in approved teacher training programs. In addition, the bill proposes a loan forgiveness program for teachers who serve in low performance schools or in shortage areas. This provision was based on research that demonstrated the success of such programs in the military and in the field of medicine. (Bond 19[illegible])

South Carolina

South Carolina education reforms are widely recognized as exemplary. "No state is more identified with education reform than South Carolina" -- The Washington Post Weekly; "South Carolina may deserve the award for best improvement [in education]" -- The Wall Street Journal; "South Carolina is clearly the leading state in the nation in school reform" -- former U.S. Secretary of Education Terrel H. Bell; "South Carolina's executives and educators are the Oscar winners for the best conceived state education reform" -- Michael Kirst, professor, Stanford University. (Cited in South Carolina Business-Education Committee 1988)

The Business-Education Committee played a major role in developing South Carolina's Education Improvement Act and continues to influence school reform in that state. Terry Peterson, the Executive Director of the Business-Education Committee, reports that provisions of the 1983-84 reform package were often based on research, particularly in the areas of early childhood education and school effectiveness. For example, the 1984 Education Improvement Act establishes both mandatory kindergarten and half-day programs for four-year-olds considered to be "at-risk." The statute also calls for the development of school improvement councils that must report regularly not only on schooling outcomes but also on the factors mentioned in the school effectiveness research. In addition, the legislation mandates that state inservice training must be "based on the findings of research."

More recently, research on parents as first teachers (for example, research on programs in Missouri and Kentucky) has influenced the development of proposals for similar programs in South Carolina. Research on effective state-local governance arrangements influenced the development of legislation calling for compensatory education and remedial programs that are drawn from proven practices, not based on prescriptions from the state. The state's role is to monitor results. Research has also influenced legislative proposals for selective granting of waivers from state regulation in order to promote innovative educational practices at the local level. (Fuhrman 1989, Peterson 1990)

Florida

Florida is also widely regarded as a leader in education reform. Dorothy Routh, Director of Policy Research for the Florida State Department of Education (and former chief counsel to the President of the Florida State Senate), reports that research has played a major role in guiding the development of education legislation in that state. For example, federally sponsored research by Richard Elmore and Milbrey McGlaughlin (1988) has led Florida to adopt a general strategy of promoting state education initiatives that are "enabling" rather than prescriptive. Under these programs, the State develops general objectives and the local districts determine how they will meet those objectives. For example, the State has recently developed a grants program designed to encourage local district restructuring. Another program rewards high schools for increasing student achievement. The State sets the goals; local districts determine <u>how</u> they will increase student achievement.

Florida recently developed a comprehensive state plan for teaching mathematics and science. To produce this plan, developers drew heavily from such research fields as learning theory, organizational theory and implementation studies. As

part of this plan, the State runs summer workshops for school teams consisting of the principal and a mentor teacher. The workshop curriculum was developed from the research literature. In addition, the State regularly publishes "Hot Topics" research syntheses and distributes them to all local school boards and other members of the education community. Recent syntheses have been published on restructuring education, parent involvement, and AIDS education. (Routh 1990)

Kern Alexander, former education aide to then Governor, now U.S. Senator, Robert Graham, reports that education research consistently served as one of the major sources of education legislative initiatives from Governor Graham's office. For example, research on Houston's experience with merit schools led to the development of merit schools in Florida. Alexander also points out the substantial impact of school finance research on policy development in this field. Research has played, and continues to play, a major role in this area by supporting litigation to overturn school finance systems in numerous states across the country. Research has also led to such school finance reforms as weighting special education needs in school finance formulas in Florida, as well as in a number of other states. (Alexander 1990)

Connecticut

Connecticut is developing a number of path-breaking education policies. Pat Forgione, Director of the Division of Research, Evaluation, and Assessment in the Connecticut State Department of Education, reports that research has played a fundamental role in these efforts. For example, the State is building a set of teacher performance assessments that allow beginning teachers to demonstrate their content and pedagogical knowledge. This set of instruments is based heavily on research performed by Gaea Leinhardt at the Center for the Study of Learning at the University of Pittsburgh, work by Lee Shulman at Stanford University, and research by David Berliner from Arizona State University. Connecticut has also developed a pioneering approach for expert teachers to assess novices. Here, again, Forgione reports that this work was steeped in research. The state has trained 650 experts to observe and evaluate the performance of novice teachers along three dimensions: management, instruction, and assessment. Research from the federally sponsored mathematics center also influenced the state's development of criterion-referenced mathemat. s assessments that encourage students to use calculators to engage in problem solving. This enables assessors to separate computation mistakes from thinking mistakes.

ORGANIZATIONAL INITIATIVES

Discussed below are three organizations that have used research extensively to engage in activities that impact substantially on education policies. The Educational Testing Service is revising the National Teachers Examination; the Education Commission of the States is working with states to improve secondary schools; and the Carnegie Council on Adolescent Development is influencing how children are taught in middle grades.

The Educational Testing Service: Revising the National Teachers Examination

The National Teachers Examination (NTE), developed by the Educational Testing Service (ETS), is currently used, in whole or in part, by 30 states as a portion of the process for licensing beginning teachers. The Education Testing Service is now in the process of completely revamping this test. Penny Engel, from the National Relations Office of the Educational Testing Service, reports that this exercise is based almost entirely on research. ETS staff who are developing the successor to the NTE have conducted ERIC searches, contacted the Special Interest Groups of the American Educational Research Association, and collected information from other networks of researchers. The work draws from a wide spectrum of research, including the work on what teachers know and how they think (by Deborah Ball and Penny Peterson at Michigan State, and by Lee Shulman at Stanford), the process-product research developed by Jere Brophy and others, the effective schools research, and the research on teacher policy, classroom management, and student evaluation. (Engel 1990) This broad range of research provides the knowledge base that allows ETS developers to design teacher assessment tools that can help improve the quality of the nation's teaching workforce.

Education Commission of the States - "Relearning" Schools

The Education Commission of the States (ECS) is working with six "relearning" states and fifteen "networking" states to help reform secondary schools. The six core states are providing funding to ten secondary schools to support their transition to becoming "relearning" schools. (The "networking" states are observing developments in the pilot states.)

The framework for the schools evolved from ethnographic research on high schools conducted by Sizer (1984) and by Powell, Farrar and Cohen (1985). It emphasizes developing such conditions as: schools setting high but anxiety-free expectations; students mastering limited skills; and teachers performing as coaches while students perform as workers.

Training is provided at the school sites by Ted Sizer's Coalition of Essential Schools. The Education Commission of the States is providing assistance to the states to develop a policy environment that supports the development of these schools. ECS staff build their work with the states on research on constructive state-local relationships and the use of productive policy tools. (Palaich 1990)

Carnegie Council on Adolescent Development

Ruby Takanishi, Executive Director of the Carnegie Council on Adolescent Development, reports that the Council's recent study on middle grade schools was a synthesis of research and practice, as well as recommendations. The report is intended to muster community support and provide guidance to those interested in developing or refining local programs for middle grade students. The report, grounded in a broad base of research ranging from studies of adolescent development to research on school organization, received wide media attention. Since June, more than 40,000 copies of the report have been distributed; the majority have been requested by local school districts.

For example, the Juno, Alaska school district has requested copies of the report to help guide the development of an $18 million program to build and restructure schools for middle grade students. The Stamford, Connecticut schools have just received a $2 million grant to build a program based on the Council's recommendations. At the state level, Hawaii, for example, has established a task force that is using the Council's report to guide its deliberations on the education of adolescent youth. And the Carnegie Commission plans a series of grants to enable selected states to implement the recommendations of this report.

SPECIFIC PROGRAMS

Discussed below are three examples of programs that report explicitly using research to guide their development: the Arkansas Classroom Management Training Model; Comer Schools, a program for improving services to low income, high-risk elementary school students; and the Blueprint for Academic Achievement, a program developed to teach reading more effectively in the School District of Philadelphia.

Classroom Management in Arkansas. The Arkansas "Total Teaching Act" served as a precursor to the "Classroom Management Model." The "Total Teaching Act" was **based on "reviews of the literature on effective teaching and implementation of change in schools** and an assessment of needs within the state." (Evertson and Smylie 1986, p.4) Initiated by the Chief State School Officer, the "Total Teaching Act" consists of seven components: knowledge of content, planning skills, selection and use of appropriate

materials, classroom management skills, human relations skills, instructional skills, and knowledge of human growth and development.

Between 1979 and 1982, over 10,000 of the state's teachers, more than 70 percent of the state's school principals, and representatives of over 60 percent of the local school systems received training under this program. Instructors were local personnel -- including teachers, administrators, and instructional supervisors -- who had been trained by the state to conduct workshops. (Evertson and Smylie 1986, p. 4) Two studies assessing the relationship of this program to student achievement suggested that this training led to improved student performance. (Dildy 1982, Lane 1982)

In view of the relative success of this effort, administrators from the Arkansas State Department of Education sought to conduct similar training focusing on classroom management. The "Classroom Management Model" was developed **"based on research on classroom organization and management and effective teaching."** (Evertson and Smylie, p.2) It focuses on three broad areas of classroom management: (1) planning -- the use of physical space in the classroom, rules and procedures, consequences for appropriate and inappropriate student behavior, and beginning of school activities; (2) presenting -- teaching rules and procedures to students, instructional clarity; and (3) maintaining productive learning environments -- developing systems for student accountability, monitoring and adjusting student behavior and performance, organizing for instruction, and developing strategies for the prevention of potential problems. (Evertson and others 1985) In 1983 the state publicly adopted the program. By early 1986, about 150 school districts -- approximately 45 percent of all districts in the state -- had implemented the Classroom Management Model. (Evertson and Smylie 1986, p.8)

Comer's School Development Program. James Comer conducted nineteen years of research and development in two New Haven, Connecticut, public schools (The Martin Luther King School and the Katherine Brennan School) to develop a program to increase the school performance of low-income, high-risk children. His School Development Program, built on research from such fields as child development, social psychology, and systems management, promotes a school climate that is both caring and challenging. The program deliberately combines academic instruction with the development of social skills. (Comer 1987-88) Planning and governance is carried out by a team consisting of the school principal, elected parents and teachers, and a mental health specialist -- "all the adults who have a stake in the outcome." The key to academic success, says Comer, is "to promote psychological development in students, which encourages bonding to the school."

When Comer's plan was first implemented in the two New Haven pilot schools in 1969, student achievement there ranked lowest among the 33 elementary schools in the city, attendance rates were among the city's lowest, and behavioral problems were severe. "In 1986, the original project school -- with no change in socioeconomic makeup-- tied for third in achievement out of 26 elementary schools, and students ranked about a year above grade level by the fourth grade on the Iowa Test of Basic Skills. This school has ranked among the top five schools in attendance for the last seven years, and there have been no serious behavioral problems in the school for well over a decade." (Comer 1980, 1987)

The model has now been extended to all low-income schools in New Haven. The Prince Georges, Maryland and Benton Harbor, Michigan school districts (which serve mainly low-income black children) have been using the model for several years with similar success. The program has been extended to cover all New Haven elementary schools serving low income children, and it has been introduced in more than 70 schools across the country, including Norfolk, Virginia, Lee County, Arkansas, and Leavenworth, Kansas. (Comer 1988, "Give & Take" 1990)

Teaching Reading in Philadelphia. In October 1975, the Deputy Mayor of Philadelphia invited the Superintendent of Schools of Philadelphia and the President of the Federal Reserve Bank of Philadelphia to meet with him to discuss a recently released report on teaching reading in Philadelphia schools (Summers and Wolfe 1975). The report had been prepared by economists at the Philadelphia Federal Reserve Bank. Although the report presented numerous recommendations for improving schools, it was not readily received by the individuals in the school district. Agreement was reached to perform a follow-up study based on the Reserve Bank methodology, but also incorporating the concerns and learning priorities of the school district. (Kean 1980)

The ten highest achieving schools, along with the ten lowest and five in the middle, were chosen for study. The study covered principals, reading teachers, classroom teachers, reading aides, and a total of 1,828 students. Key findings include: pupils who attended kindergarten seemed to gain more than those who did not; the more often the principal observed classrooms, the more students achieved; pupils achieved more in schools with more professional support staff; pupils taught in small group/whole class combinations achieved more than pupils who were taught individually only, in small groups only, or as a whole class only; and pupils taught by the linguistic basal approach achieved distinctly more than pupils using other reading approaches.

Throughout the study, the researchers took great care to help important actors in the school district develop a sense of ownership over the work. They also anticipated possible problems and sought to avoid them. In addition, they deliberately presented the findings of the work in a manner that would be most useful to potential users of the research. (This approach is consistent with recommendations for research utilization that have been voiced by McDonnell (1989), Mitchell (1981), and Florio, Behrmann and Goltz (1979).) As a result, the study played a major role in framing the Blueprint for Action that the Superintendent of Schools presented to the Board of Education in 1979. Furthermore, the impact of this work reached far beyond Philadelphia's schools. The authors of the work report receiving more than 5,000 requests for information about the study. (Kean 1980)

BROAD IMPACTS OF RESEARCH

INFLUENTIAL RESEARCH

Three influential bodies of research are discussed below: (1) the effective schools research, (2) studies of early childhood education, and (3) research on higher order thinking. In each case, I provide examples of the influence of research on the design, development or implementation of education policies, followed by an overview of the body of research under discussion.

Effective Schools Studies

The General Accounting Office (GAO) (1989) reports that the effective schools literature is markedly affecting state and local policies across the nation. The GAO surveyed a representative sample of school districts, asking ". . . district officials whether any of their schools operated school improvement programs **based on the findings of the effective schools research**" [italics added]. The survey revealed widespread impact of the effective schools research on district and state policy.

> District responses. . . indicate that about **41 percent or 6,500 of the nation's school districts had effective schools programs in operation in approximately 38,000 elementary and secondary schools during school year 1987-88.** Many districts reported that their programs had been established recently; over half had effective schools programs that were first implemented during school years 1986-87 or 1987-88. **An additional 17 percent or about 2,600** of the nation's districts **have plans to implement effective schools programs during school years 1988-98 or 1989-90** [italics added]. (p.2)

In addition, the GAO reports that more than 30 states provide financial support, staff training, or technical assistance to help schools and school districts develop and implement effective schools programs (GAO, 1989, Appendix VI). In short, the GAO concludes: **"The findings of school effectiveness research were rapidly adopted by schools, districts and states as models for school improvement programs during the 1980s."**

An investigation of recent major education legislation clearly reveals the impact of the school effectiveness literature on Federal education policies. The recent Hawkins-Stafford Elementary and Secondary School Improvement Amendments of 1988 (P.L. 100-297, amending the Elementary and Secondary Education Act of 1965) authorized the use of Chapter 1 compensatory education funds and Chapter 2 educational improvement block grant funds to support effective schools programs. This legislation was developed immediately upon the heels of a House Committee on Education and Labor Report entitled Increasing Educational Success: The Effective Schools Model (100th Congress, 1st Session). That report included a number of analyses of different aspects of the Effective Schools research and a selection of published articles and studies that form a major part of the Effective Schools literature.

According to a recent House Committee on Education and Labor Report (Improving Education: School Districts Implementing the Effective Schools Model (101st Congress, 1st Session)), sections of P.L. 100-297 designed to promote school improvement are based explicitly on the Effective Schools research.

> The Congress of the United States recently enacted legislation directing Federal assistance to the implementation and expansion of educational projects **based on the Effective Schools research** [italics added]. As defined in the legislation[2], Effective Schools projects are intended to:
>
> . . . .
>
> (3) achieve certain characteristics in participating schools that are identified in the Effective Schools research. The characteristics which reportedly distinguish effective schools from others are:
> (1) strong and effective instructional leadership;
> (2) a focus on basic and higher order skills;
> (3) a safe and orderly school environment;
> (4) the expectation that nearly all children can learn; and
> (5) ongoing assessment of student performance and program effectiveness. (p.1)

These policies are based on the effective schools literature which has been broadly defined to include studies on school effectiveness, teacher effectiveness, organizational management, and program implementation. To date, however, most of the school improvement programs based on this literature have relied primarily on the findings of the school effectiveness studies. (GAO 1989, p. 12) Most of the studies in the field focused on urban elementary schools serving low income minority students. Probably the most influential researcher and advocate of these programs was the late Ron Edmonds, who, as a New York City school administrator, launched that city's effective schools program in 1978. (Edmonds 1979, 1982) Edmonds' work has been buttressed by a number of confirming replications, including studies of inner-city secondary schools in London (Rutter 1979) and comparisons of public and private schools. (Coleman, Hoffer and Kilgore 1981) (For an excellent review and analysis of this body of literature, see Purkey and Smith 1983.) Work in this field identified schools where students were achieving far beyond what was expected, given their family backgrounds. Researchers then attempted to discover the characteristics these schools had in common.

A number of school effectiveness studies yielded similar findings. They discovered that high achieving schools tend to focus on basic-skills acquisition **and** acquisition of higher-order cognitive skills. They also found that similar attitudes pervade these schools: high expectations for student achievement, teacher accountability and acceptance of responsibility for student performance, teacher empathy, rapport and interaction with students, high teacher morale and a sense of community in school, and district-level support for school improvement. In addition, a common context exists for learning, including: strong instructional leadership; a safe, orderly, and disciplined school climate; teacher responsibility for instructional and classroom management decisions; individual school autonomy and flexibility; and staff stability and continuity. Furthermore, these high achieving schools tend to employ similar processes, including: monitoring student achievement frequently to evaluate progress; collaborative, collegial instructional planning; cooperative activity and group instruction in the classroom; high levels of parental involvement and support; schoolwide recognition of academic success; and strategies to avoid retaining students in grade. (Edmonds 1979, 1982; Brookover and Lezotte 1979; Rutter and others 1979; Mackenzie 1983; Purkey and Smith 1983, 1985; GAO 1989)

Some researchers have urged caution regarding the widespread adoption of the findings of the school effectiveness research. They are concerned about (1) the lack of clear demonstrations about cause and effect; (2) generalizing the findings beyond the urban elementary schools where most of the work was conducted;

and (3) school improvement through the application of simple formulas. (Cohen 1983, Purkey and Smith 1983, Rowan and other 1983, D'Amico 1982) Nonetheless, this body of research has had a clear and marked influence on policies and practices at the Federal, state and local levels of American education.

Early Childhood Education

At the Federal Level. No doubt research on early childhood education has influenced policymakers at the Federal level. Research revealed a seven-to-one benefit-cost ratio from investments in early childhood education. This ratio has been explicitly mentioned in the development of Federal legislation related to early childhood education. ("Bring Back Big Spending" 1989) Recent Federal bills promoting early programs for children include Smart Start (S. 123/H.R. 1234) which proposes $500 million in its first year (increasing to $1 billion by the third year) to fund full-working-day, year-round, child development programs primarily for 4-year-olds; and the Child Development and Education Act (H.R. 3, popularly known as the Hawkins bill) which proposes to divide $2.5 billion evenly among three titles: one expanding Head Start, the second expanding before- and after-school development programs for children aged 4 through the early elementary years, and the third providing additional services for children under age three. (Mitchell 1989)

Furthermore, participants in President Bush's recent Education Summit identified the first area where the nation should set education goals as "the readiness of all children to start school." (Hoffman and Broder 1989) The Bush Administration has proposed increasing Head Start funding by $500 million, the largest single-year budget increase in the history of this program. This 36 percent increase would bring total funding to $1.9 billion. (Pierce 1990)

At the State Level. New initiatives are appearing at the state level, as well. The National Conference of State Legislatures reports that legislators on human service committees rank child care and early childhood education as top issues for 1990. (State Issues 1989 1989) "Many governors have put programs serving the needs of children high on the agenda in their state-of-the-state messages -- from the Children's Agenda in Oregon to the Decade of the Child in New York." (Mitchell 1989) Governor Madeleine Kunin (1989) notes that Vermont "has made an unprecedented commitment to affordable child care. . . . Between fiscal 1985 and 1990, Vermont's financial support for subsidized child care will have nearly tripled." Florida's prekindergarten program, originally funded at $700,000 in fiscal year 1987, was funded at $22.9 million for fiscal year 1989; Michigan moved from $2.3 million in fiscal year 1987 to $15 million in fiscal vear 1988; and Illinois doubled its prekindergarten appropriation from

fiscal year 1988 to fiscal year 1989. (Marx and Seligson 1988) By 1989, 31 states were funding prekindergarten programs and/or providing direct contributions to Head Start. (Mitchell 1989) Often, deliberations about the development of these early childhood policies and programs have been informed by research, such as the federally funded work by Grubb (1987) which is designed to help policymakers lay out the issues involved in the area of early childhood education. (Center for Policy Research in Education 1989)

Parent Education. Sharon Kagan (1989) notes that many of these early childhood initiatives include some form of parent education. As of 1988, one-third of the states were sponsoring some type of program dealing with parent education. (Marx and Seligson 1988) Missouri's New Parents as Teachers is a prominent example of such a program. This effort began in 1981 as a demonstration project serving 380 families. The program provides information on child growth and development, periodic developmental and health screenings, monthly home visits by parent educators, and monthly group meetings at neighborhood parent resource centers.

A recent evaluation of this program indicates that it led to significant increases in children's intellectual and language abilities and school readiness[3]. The program has now been implemented throughout Missouri, and is being emulated in other states and districts. U.S. West Corporation plans to invest $10 million over the next three years to promote parent education programs, based on the Missouri model, throughout the Western States. (Cohen 1990)

Pfannenstiel and Seltzer (1989) point out that this particular program was based on research indicating (1) the importance of the first three years of a child's development (White, Kaban, and Attanucci 1979; White and Watts 1973; White 1971; Bloom 1964); (2) the benefits of parent and early childhood education (Powell 1986, Slaughter 1983, Ramey and Haskins 1981, Consortium for Longitudinal Studies 1979, Garber and Herber 1977); and (3) the value of social support systems to parents during times of stress -- such as the birth of a firstborn child. (Slaughter 1983; Gottlieb 1981; Haggerty 1980; Wandersman, Wandersman and Kahn 1980; Unger and Powell 1980)

Another example, the Kentucky PACE (Parent and Child Education) Program, has served about 500 families since 1986. Legislation in 1988 extended eligibility to all districts in the state where at least 50% of the adults lack a high school diploma. This program is deliberately designed to enrich the home education environments of children whose parents have not completed high school.

In PACE programs, parents attend public school along with their 3- or 4-year old children. Each PACE instructional team includes an early childhood teacher, a teaching assistant, and an adult education teacher. During the first two hours of the day, parents take classes in adult education and life skills, while their children are in a preschool program. At scheduled times, parents teach their own children in the classroom. After lunch, parents attend sessions on child care and family management, while the children nap. ("Options and Opportunities" 1989)

The results of this program are striking. Seventy percent of the adults enrolled in the program have either received GED certificates or raised their achievement scores by at least two grade levels. As a result of this program, parents demonstrate a better understanding of their children's abilities and needs and have raised their aspirations for their children's education. The preschoolers demonstrate measurable developmental gains as a result of the program, and classroom teachers report significant positive differences between children who have gone through PACE and those who have not. PACE was one model for the Federal Even Start Program and is being considered for adoption in other states, as well.

Kagan (1989) points out that the roots of parent education programs lie in the research of Coleman and others (1966) demonstrating the link between home environment and school performance, the work of Bronfenbrenner (1974) and others on early childhood development, as well as recent studies that support the critical role of families in the educational process. (Henderson 1981, Powell 1989)

The Perry Preschool Project. Many early childhood education policies refer to the Perry Preschool Project, a major research effort that demonstrated the potential payoff of investments in early childhood education. This long-term project studied the experiences of children from preschool through age nineteen. The study was based on a sample that was small relative to many cross-sectional analyses; however, it collected data from the same individuals over a long period of time, and used a true experimental design with randomized assignment to the treatment.

The sample consisted of 123 black youths from families of low socioeconomic status who were at risk of failing in schools. All the children resided in the same school attendance area. At ages 3 and 4 the youngsters were randomly divided into two groups: an experimental group that received a "high quality" preschool program, and a control group that received no preschool program. The intellectual roots of this study are found in prior research by Hunt (1961), Bloom (1964), and Piaget and Inhelder (1969). (Berrueta-Clement and others 1984)

The major longterm findings of the study are presented in Table 1.

Table 1

MAJOR FINDINGS OF THE PERRY PRESCHOOL STUDY

Category	Preschool Group	Control Group
Mean IQ at age 15	95	83
Age 15 Achievement Test	122.2	94.5
Percent of Years in Special Education	16%	28%
High School Graduation (or its equivalent)	67%	49%
Postsecondary Education	38%	21%
Employed at age 19	59%	32%
Females Only: Teen Pregnancies, Per 100	64	117
Receiving Welfare at age 19	18%	32%
Ever Detained or Arrested	31%	51%

Source: Barnett 1985, p. 4. Note: The IQ and achievement differences are significant at the .001 level. All other differences are significant at the .05 level, except the pregnancy difference, which is significant only at the .08 level (possibly due to substantially lower responses rates on this question).

A benefit-cost analysis of outcomes associated with one year of preschool, including estimates of the economic benefits of reduced dependency on welfare and reduced crime, yielded a benefit-cost ratio to society of seven to one. That is, the analysis suggests that every dollar invested in preschool education of the type provided by the Perry Preschool project is likely to yield the equivalent of seven dollars in later savings.

(Note: the seven dollars represents savings discounted back to present value.) (Berrueta-Clement and others, p.90-91) This benefit-cost ratio expresses the value to society of preschool programs (based on data from this one study).

The Impact of Research. Brown (1985) describes the impact of early childhood education research in glowing terms: "The story of . . . [early intervention] research is a thrilling adventure about how new ideas can change the future for millions of children and their families." He describes the evolution of the Consortium for Longitudinal Studies and demonstrates how the cooperative efforts of researchers led to the development of a compelling body of knowledge. This group of studies (along with other work) demonstrated that early intervention significantly reduces the number of children assigned to special education classes, substantially reduces the number of children retained in grade, produces a significant increase in the IQ and school achievement of low income children through at least the critical early primary years, and leads parents to develop high vocational aspirations for their children. (Lazar and others 1977; Consortium 1979, 1983; Lazar and others 1982; Royce, Lazar and Darlington 1983; Harrel 1983; Evans 1985; McKey and others 1985; Powell 1986; Barnett and Escobar 1987; Ramey and Campbell 1987; Balasubramaniam and Turnball 1988; Barnett and others 1988; Larsen and Robinson 1989) The point is, the early childhood education research, like the set of effective schools studies, was made up of a **body of studies with consistent, supportive conclusions**. As a result, policymakers can rely on this work with some confidence as they develop programs to improve the education of our children.

However, Haskins (1989) appropriately cautions against generalizing from studies of model programs to develop policies about national programs such as Head Start. He argues that model programs demonstrate what is possible, but we need to better understand why individual Head Start programs sometimes fail to reach this potential. He calls for additional research to help us learn how we can develop universally productive preschool programs.

The Rockefeller Foundation is one of the first organizations to respond to this call. The Foundation recently announced a 17-year multimillion-dollar study of the long-term effects of child care that will examine both Head Start and other day care and preschool programs. (Chira 1990)

Clearly, a substantial, and growing, body of research has demonstrated the value of early childhood and parent education programs. New studies are needed to identify the factors that are most productive in such programs. The results of such work will help policymakers and practitioners as they develop or refine policies and practices in this important field.

Higher Order Thinking

Studies of higher-order thinking form the basis of a number of policy developments. At the Federal level, as noted above, concepts related to "higher-order thinking" have been incorporated into education legislation. These concepts were also reflected in the recent Education Summit. "In their closing statement, summit participants said the idea of the goals was to create 'a rigorous program of instruction designed to ensure that every child can acquire the knowledge and skills **required in an economy in which our citizens must be able to <u>think</u> for a living** '"[italics added]. (Swoboda 1989)

State initiatives to promote higher-order thinking are increasing as well. For example, the California Board of Education rejected all mathematics textbooks proposed for kindergarten through eighth grade because the books overemphasized memorization and math drills and underemphasized the development of logical thinking skills. (Fallon 1986, <u>Education Week</u> 1986) California decisions about textbooks play an important role nationwide because that state's purchases account for about 11 percent of the total textbook industry.

At the local level, schools are responding by increasing the time that is spent on promoting thinking. A prominent example is the Higher Order Thinking Skills (HOTS) Program developed by Professor Stanley Pogrow of the University of Arizona. This program was developed five or six years ago using Federal research funds. It is now being used by Chapter 1 teachers in more than 300 schools in 22 states serving more than 9,000 students. The program is likely to be in over 600 districts by next year.

The HOTS program combines modern computers with ancient Socratic techniques to present an intellectually challenging learning environment to elementary school students (primarily Chapter 1 students in grades 4 through 6). Students in these settings not only improve their problem solving skills, they dramatically improve their basic skills, as well. For example, students in this program in the Jamestown Elementary School in PA gained 5.6 years on the Stanford Diagnostic Reading test (Fall to Spring), and 20% of the fifth and sixth grade Chapter 1 students post-tested beyond the high school level. In another school, students made such large gains in math that the central ofrice required all the students to retake the test. In a scene reminiscent of the movie "Stand and Deliver," the students were retested and demonstrated, once again, their remarkable success. In the Detroit Public Schools, Chapter 1 students hated to write. After going through the HOTS writing curriculum, they produced stories that the editor of a national journal said were the best samples

of writing that elementary students had ever submitted to the journal. He was astonished to find out that these works had been produced by Chapter 1 students. When it was time to leave the writing curriculum after many months, teachers reported students lamenting, "Why can't we do writing today?" Time and again, formerly apathetic students become excited, fascinated learners under this program. They have been known, for example, to try to sneak a peak at the teacher's manual to find out what is going to happen next. Research has guided the development, evaluation, and refinement of programs such as this which are designed to teach higher-order thinking skills. (Pogrow 1990)

These initiatives are consistent with research from a number of fields including (a) studies that demonstrate particular shortcomings of American students, (b) international studies that illustrate differences in teaching approaches, (c) basic research on how students learn, and (d) studies of the skills needed by citizens and workers in the 21st century.

Shortcomings of American Students. A number of studies demonstrate that American students do not perform well on achievement tests when compared with their peers from other developed countries. For example, research has shown that the mathematics achievement of the typical American high school student is substantially below the level of the typical student in other industrialized nations. In some areas of mathematics, American students' achievement ranks lowest among advanced industrialized countries. The average Japanese student exhibits a higher level of mathematics achievement than the top five percent of American high school students enrolled in college preparatory mathematics courses. (McKnight and others 1987)

Studies indicate that while overall mathematics proficiency increased somewhat among American students from 1978 to 1986, most of these gains were due to improved performance in lower-level skills and basic concepts. American students do not perform well when required to perform even slightly complex intellectual tasks. "By, age 17, only half of the high school students demonstrated an understanding of even moderately complex mathematical procedures (material generally thought to be introduced in junior high schools) and hardly any (6 percent) could solve multi-step problems, especially if they involved understanding algebra or geometry." (Dorsey and others 1988)

Young American adults are equally limited. The National Assessment of Educational Progress recently surveyed a sample of young adults, aged 21 to 25. They found that only one in five individuals can perform such tasks as accurately using a bus schedule; only 10 percent can perform such tasks as filling out an order form, calculating the costs for a number of items, and totaling the costs, and less than 10 percent can perform such higher-order tasks as using text information to describe orally

the distinctions between two types of employee plans. (Kirsch and Jungeblut 1986). Another NAEP report, based on a 1984 assessment of a national sample of students in grades four, eight, and eleven, found that about 80 percent of students have "difficulty organizing their thoughts coherently in writing." The report attributes this condition to a "pervasive lack" of emphasis on higher-order skills throughout the school curriculum. (National Assessment of Educational Progress 1986)

International Studies. Why do students in other countries perform better on (e.g.) tests of mathematical ability? McKnight and others (1987) point out that the reason cannot be smaller class size in other developed nations. Average class size in Japan, for example, where students do well, is more than 40 students; average class size in the United States is in the low to mid 20's. The reason is not a difference in the amount of time devoted to mathematics. Japanese teachers spend an average of 101 hours per year on mathematics; American teachers spend 144 hours on this topic. Similarly, the amount of time American students spend on homework, the quality of American teachers, and the attitudes and expectations of American students do not differ from their counterparts in other developed countries.

McKnight and his colleagues argue that the critical difference appears to be the **topics covered** and the **depth of coverage.** For example, middle school mathematics in the United States tends to be characterized by a great deal of repetition and review with a focus on "low-level" arithmetic computations. Topics are fragmented and covered with little intensity. By contrast, at this level of schooling, France places a great deal of emphasis on geometry, and Japan provides an intense treatment of Algebra. McKnight and his colleagues call for restructuring the mathematics curriculum to include ". . . a substantial treatment of topics such as geometry, probability, statistics and algebra, as well as promoting higher-level process goals such as estimation and problem-solving." (p. 113)

Learning Research. Learning research further supports the importance of how material is presented. Lauren Resnick from the Learning Research and Development Center at the University of Pittsburgh recently reviewed two bodies of research -- on the nature of human thinking and on the acquisition of thinking and learning skills. (1987) She concludes:

> The most important single message of . . . [this] research is that complex thinking processes -- elaborating the given material, making inferences beyond what is presented, building adequate representations, analyzing and constructing relationships -- are involved in even the most apparently elementary mental activities. Children cannot understand what they read without making inferences and using information that goes beyond what is written in the text. They cannot become good writers without engaging in complex problem-solving-like processes. Basic mathematics will not be effectively learned if children only try to memorize rules for manipulating written numerical symbols. (p. 45)
>
> . . . [T]he kinds of activities traditionally associated with thinking are not limited to advanced levels of development. Instead, these activities are an intimate part of even elementary levels of reading, mathematics, and other branches of learning -- **when learning is proceeding well** [italics added]. In fact, the term "higher order" skills is probably itself fundamentally misleading, for it suggests that another set of skills, presumably called "lower order," needs to come first. This assumption -- that there is a sequence from lower order activities that do not require much independent thinking or judgment to higher level ones that do -- colors much educational theory and practice. Implicitly at least, it justifies long years of drill on the "basics" before thinking and problem solving are demanded. Cognitive research on the nature of basic skills such as reading and mathematics provides a fundamental challenge to this assumption. Indeed, research suggests that failure to cultivate aspects of thinking. . . . may be the source of major learning difficulties even in elementary school. (p.8)

McDonnel (1989) cites research supporting the view the students who learn science by curricula that emphasize thinking achieve better than those who simply learn facts. "Between 1956 and 1975, the National Science Foundation funded [science curriculum projects which] . . . stressed the **learning of concepts over facts** and the use of discovery methods, student inquiry, and multimedia materials to supplement textbooks. . . . Studies found that students exposed to this new science curricula performed better than students in traditional courses on measures of general achievement and analytic skills, and that they had more positive attitudes towards science." (see also: Shymanksy and others 1983)

Knowledge and Skills for the 21st Century. Benjamin (1989) recently reviewed the literature on education and the future. Regarding future knowledge and skill needs, he concludes:

> Generally, futurists suggest that because of the nature of future society (that is, technological, overloaded with information, interdependent, global, change-driven), students and citizens must be able to think critically, uncover bias and propaganda, reason, question, inquire, use the scientific process, remain intellectually flexible, think about complex systems, think holistically, think abstractly, be creative, and view and read critically (p. 9; see also Taylor 1985, Ravitch 1983, Gay 1981, Shane and Tabler 1981, Laswell 1975)

The lack of higher-order skills is particularly problematic as we move from the industrial age into the information age. Studies of the workplace needs of the 21st century demonstrate that the fastest-growing occupations require employees to have much higher math, language, and reasoning capabilities than do most current occupations. (Office of Technology Assessment 1988, Lewis 1988, Workforce 2000 1987) That is, in order to thrive as citizens and workers, our students must move beyond computation and calculation to learn the basic skills of the information age -- for example, problem solving, analytical reasoning, and critical thinking. Just as mechanical tools obviate the need for physical strength, intellectual tools diminish the importance of knowing facts for their own sake. The most successful workers and citizens will be those who use tools best, not those who emulate them.

Research has established the need to teach students to think. It has established that higher-order thinking and basic skills can, and should, be taught at the same time. And research is helping uncover effective policies and practices to teach our students the basic skills of the 21st century -- the problem solving, analytical reasoning, and critical thinking skills they will need to thrive in the world of tomorrow.

MAJOR REFORM INITIATIVES

The following section describes three recent areas of education reform and traces the roots of each to research. The three reforms are: raising student standards, evaluating teacher quality, and restructuring schools.

Raising Student Standards

The most popular type of policy change in the recent wave of state education reform was raising student standards. Forty-five states modified high school graduation requirements in the decade of the 80s, primarily by adding to the total number of required credits and by increasing the number of academic courses students must take. The additions were primarily in the areas of math and science: thirty-five states increased requirements in math; science requirements were increased in thirty states. Eleven states now require three years of math to graduate -- thirty-one states require two years of math; and the majority of states now require two years of science for graduation. In addition, twenty-five states increased social studies requirements; the typical requirement is now three years. Finally, twelve states increased their English requirement, mostly by moving from three to four years.

Increased coursework requirements are embedded in university and college admissions policies as well as in state statutes. The increase in coursework requirements for admission was the most significant trend in college entrance requirements in the early 1980s. This was true in states where admission policies are established statewide, as well as in the majority of states, in which individual institutions control entrance standards. In general, colleges and universities raised their standards before or at the same time as state standards were raised.

Students who are taking the new classes are mostly middle and lower achieving individuals who are not likely to go on to college. (College bound students, responding to university and college entrance requirements, were already meeting the new state requirements.) Moreover, although the new courses added are in academic areas, most have not been the more academically challenging types of courses. Rather, they have generally been basic or remedial, with titles like "Math Applications." To accommodate these new courses, students are taking less vocational education, physical education, home economics, industrial arts, business, psychology, and performing arts. Furthermore, concern has surfaced about finding qualified teachers and adequate facilities such as science laboratories, particularly in the areas of math and science. (Firestone, Fuhrman and Kirst 1989, Clune 1989)

Firestone, Fuhrman and Kirst (1989) point out that raising student standards responds to the Nation at Risk recommendations calling for a more uniform, less diluted curriculum built around subjects with greater academic content. The National Commission on Excellence in Education, authors of A Nation at Risk, point out that secondary school curricula in the 1970's had become

> . . . . homogenized, diluted, and diffused to the point that they no longer have a central purpose. In effect, we have a cafeteria-style curriculum in which the appetizers and desserts can easily be mistaken for the main course. . . . The proportion of students taking a general program of study [rather than vocational or college preparatory programs] has increased from 12 percent in 1964 to 42 percent in 1979. (National Commission on Excellence in Education 1983, p.18; see also Adleman 1983)

Many of the papers commissioned to help develop the Nation at Risk recommendations focused explicitly on the issue of time and learning. That is, these recommendations are grounded in research which shows that students learn more when exposed to more content, and that high expectations lead to higher performance. (Eckstein, Shafer and Travers 1982, Holsinger 1982, Karweit 1982, Maer 1982, Prokop 1982, Resnick 1982; see also, Denham and Lieberman 1980)

The research on time and learning has also influenced classroom management policies. The notion that students learn more about a subject when they spend more time on it is not surprising. But research reveals surprising variations in the allocation of learning time.

> Within reading and mathematics, classes differed in the amount of time allocated to different skill areas. For example, in one second-grade class, the average student received 9 minutes of instruction over the whole school year in the arithmetic associated with the use of money. This can be contrasted with classes where the average second grader was allocated 315 minutes per school year in the curriculum content area of money. As another example, in the fifth grade some classes received less than 1,000 minutes of instruction in reading comprehension for the school year (about 10 minutes per day). This figure can be contrasted with classes where the average student was allocated almost 5,000 minutes of instruction related to comprehension during the school year (about 50 minutes per day). (Fisher and others, p.16)

When engaged time, the time students are actually paying attention, is considered, contrasts become even more stark. Fisher and others (1980, p.16) conclude that student achievement is related to the percentage of time students pay attention

(engaged time), and they note that the average engaged time varies from 50% in some classes to 90% in others. Berliner (1989, p.14) notes, ". . . research informs us that these concepts [the concepts of time devoted to instruction] are of major importance." In fact, he concludes, "time is the single most important resource over which schools have control." The research on time and instruction has clearly influenced the development of policies on instruction and classroom management.

Evaluating Teacher Quality

During the 1980s, state legislators considered over one thousand pieces of legislation dealing with teacher certification and compensation -- an unprecedented amount. Virtually every state enacted policies to reform teacher education and licensing, and the majority altered salary policies in this period. (Darling-Hammond and Berry 1988, p. v)

Firestone, Fuhrman and Kirst (1989, p. 33) argue that the composition of the teacher workforce became a policy concern in the 1980s for two reasons: "studies suggesting declines in the quality of those entering and remaining in the teacher workforce" and "fear of imminent shortages."

Several studies have examined the quality of the teacher workforce, focusing primarily on the academic ability of teachers. (Weaver 1981, Vance and Schlechty 1982, Sykes 1983) The consistent conclusion of this work is that education majors and those who become teachers tend to score lower than their peers on academic achievement tests, and that, of those who initially enter teaching, the most academically able, as measured by SAT scores, are the most likely to leave.

In the mid-1980's, a number of studies debated whether or not a teacher shortage was about to occur. Gerald (1985) estimates that between 1988 and 1992, schools of education will produce less than 75 percent of the teachers needed to staff U.S. schools. On the other hand, Feistritzer (1986, p.1) argues, "Contrary to predictions, there seems to be no problem finding enough qualified teachers to meet demand." The Carnegie Forum (1986, p.27) tells us, "Unless teaching as a career changes, in the years to come there will be a growing gap between teacher supply and demand, according to quite conservative projections." But Heckler (1986, p. 17) concludes that no shortage of teachers currently exists, and "indications. . . are that no shortage of teachers will develop" between now and 1995.

Fox (1988) reviews these arguments, and concludes that the analyses differ due to (1) differing views of the demand for teachers (note for example that the average number of pupils per classroom teacher, by state, ranges from a low of 14.4 in Wyoming to a high of 24.2 in Utah); (2) differing views of the potential

supply of teachers -- how many education majors will actually teach, how many will leave teaching soon after entering, how many will reenter from the so-called "reserve pool"; and (3) differing views of the filters that should be applied to control the "quality" of those entering the teacher workforce.

Many of the policies related to teachers focus on certification tests. By 1986, all but four states had mandated teacher competency tests in basic skills, subject matter knowledge, or professional knowledge. This particular reform predated the major wave of 1980s reform. Georgia mandated the first teacher certification test in 1975; 28 states were using some form of teacher testing before A Nation at Risk was published in 1983. By 1986, 46 states used a teacher assessment system that affected licensure. (Sandefur 1986)

The form and content of teacher assessment differs substantially across states, although about half the states rely on the National Teachers Examination. Some states use customized examinations to assess basic skills and subject matter knowledge of prospective teachers. These tests are usually developed within the state, although some are developed by such organizations as the Educational Testing Service or National Evaluation Systems.

Shulman (1987, p. 10) notes that recent research on teacher effectiveness (Brophy and Good 1986; Gage 1978, 1986; Rosenshine and Stevens 1986, and Shulman 1986) has influenced the development of such examinations as the National Teacher Examinations and state-level assessments of teaching performance during the first year of teaching.

However, many teachers and teacher educators, as well as many researchers, argue that such professional knowledge tests fail to adequately assess the knowledge and skills important to teaching. For example, Rosenshine (1986) argues that the effective teaching research applies more to teaching basic skills like multiplications than to teaching understanding. Also, Shulman (1987) argues that general teaching principles should not become prescriptions. In response to such concerns, a number of states, such as Connecticut, Minnesota, and Missouri, are moving beyond paper-and-pencil tests toward more performance-oriented assessments. (Darling-Hammond and Berry, p.29)

In addition, many are concerned that a large proportion of minority applicants fail to pass such tests. For example, research has revealed that over a five year testing period, only 15 percent of all Black teaching candidates in Louisiana passed that state's test, an average of 40 Black candidates a year.

This figure is well below the 580 Black teachers needed if the staff racial balance is to be maintained. (Baratz 1986) Studies indicate that regardless of the state, and regardless of the type of examination, disproportionate numbers of minority applicants fail the test. (Smith 1984)

Research is guiding the development of efforts to improve teacher assessment procedures, including the development of a National Board for Teaching (Shulman 1987), new assessment procedures based on the notion of the teacher as a reflective professional (Peterson and Comeaux 1989), and a major revision of the National Teachers Examination. (Engel 1990)

Restructuring Schools

Restructuring schools means different things to different people. Miller (1989) points out that this term might refer to such issues as changing the curriculum; modifying the way we organize for instruction; changing federal-state-local relationships; implementing school-based management; reforming how we prepare, certify, and compensate teachers; modifying school finance and governance; dealing more effectively with at-risk students; or simply changing the way people think about education. However, much of the debate over restructuring schools has focused on changing who controls what, with specific attention on increasing the authority and responsibilities assigned to teachers.

In the mid-1980s, a number of influential reports called for restructuring the distribution of authority within the American education system. A principal thrust of these works was to move more authority and autonomy to the school site, increasing, in particular, the scope of decisions to be made by teachers. The Holmes group (1986) calls for teachers who are "empowered to make principled judgments and decisions on their students' behalf." The Carnegie Forum (1986) is more expansive:

> Within the context of a limited set of goals for students set by state and local policymakers, teachers, working together, must be free to exercise their professional judgement as to the best way to achieve these goals. This means the ability to make -- or at least influence -- decisions concerning such things as the materials and instructional methods to be used, the staffing structure to be employed, the organization of the school day, the assignment of students, the consultants to be used, and the allocation of resources available to the schools. (p.58)

The National Governors' Association (1986), drawing on the work of the California Commission on the Teaching Profession (1985, p.38), adds its endorsement to this principle: "Teachers will have to be involved in decisions about discipline, school goals, their own continuing education, curriculum, and schoolwide problem solving."

These calls respond to the current state of affairs:

> Public school teachers have almost no authority over the design and administration of [schools]. . . . Criteria for determining class composition and size, scheduling, curriculum and test content, the training, evaluation, and promotion of faculty; delegating workloads, planning and allocation of "space". . ., and so on -- all this is controlled by legislatures and by lay boards and their administrators. (Nybeg and Farber 1986, p.4)

In practice, a few states, such as Washington, Arkansas, Maine and Massachusetts, have initiated programs to encourage school restructuring. However, most of the creative development is being undertaken by individual school districts. (Firestone, Fuhrman and Kirst 1989, p.15) To date, restructuring has occurred primarily in a few pioneering districts, including the Dade County Public Schools (Miami, FL), the Jefferson County Public Schools (Louisville, KY), the Poway Unified School District (Poway, CA), the ABC Unified School District (Cerritos, CA), the Cincinnati Public Schools (Cincinnati, OH), District 4 in Manhattan's East Harlem (New York, NY), the Hammond Public Schools (Hammond, IN), the Rochester Public Schools (Rochester, NY), and the Chicago Public Schools (Chicago, IL).

Efforts in these pioneering districts have surfaced three principles: (1) the goal of restructuring is long-term, comprehensive change guided by a conception of schools as stimulating workplaces and learning environments; (2) school staff need the authority, skills, and time to create new roles and environments appropriate to their situations; and (3) restructuring requires new conceptions of accountability. In exchange for increased authority and flexibility at the school site, principals and teachers are willing to demonstrate results. But such demonstrations rest on new kinds of accountability that are characterized by more flexibility than in the past. Now the emphasis is on multiple measures, including qualitative as well as quantitative measures, a shift from paper measures to on-site inspection of practices and perceptions, and, most importantly, a focus on the instructional goals and results of restructuring instead of compliance with rules and procedures. (David 1989, Elmore 1988)

Roots of this movement toward local autonomy are found in three bodies of research: investigations of educational change, studies of particularly effective business enterprises, and the effective schools literature. Studies of educational innovations reveal that successful educational change is enhanced by a substantial amount of local participation in adapting the innovation to the needs and environment in which it must work. (Elmore and McLaughlin 1988; Fullen 1982; Berman and McLaughlin 1978,1975)

David Kearns, Chief Executive Officer of the Xerox Corporation, argues that schools should be organized like innovative businesses:

> Schools today ought to look like the smartest high-tech companies look, with lean structures and flat organizations. Today's smart companies push decision making down into the organization. Professionals and managers are trusted with the authority to get their jobs done, and they're held accountable for their performance. I think the schools have to be structured that way, too. (1988, p. 567; see, also, Kearns and Doyle 1988, Peters and Waterman 1982)

As noted above, the effective schools literature has revealed that "the leadership and staff of a school need considerable autonomy in determining the exact means by which they address the problem of increasing academic performance." (Purkey and Smith 1983)

FEDERAL RESEARCH INITIATIVES

Much of the research mentioned above has been supported, in whole or in part, by the Federal government. In addition, the following federally supported research projects provide examples of substantial contributions of research to the development of education policies.

Becoming a Nation of Readers

In 1985, the Center for the Study of Reading at the University of Illinois, in collaboration with the Center for the Study of Learning at the University of Pittsburg, provided the bulk of research that served as the foundation for a book on teaching reading, Becoming a Nation of Readers. (Anderson and others 1985) More than 200,000 copies of this booklet are currently in circulation. California orderec 10,000 copies -- one for every superintendent and elementary sc ool principal in the State; Mississippi ordered 2,000 copies; at least two states, South Carolina and Connecticut, conducted workshops for teachers based on this study (more than 1,000 teachers attended); and multiple copies of the booklet have been reprinted by school districts in

a number of cities, including Chicago, New York City, San Diego, and in Prince Georges and Fairfax Counties. Also, the American Federation of Teachers has reprinted multiple copies for its members. Furthermore, a brochure based on this work, "10 Ways to Help Your Children Become Better Readers," has been distributed to more than 80,000 schools and libraries across the country. Of course, "sales figures" are no guarantee of impact, but they do provide some measure of the value of a work.

Cooperative Learning

"Cooperative learning" is a teaching strategy that involves placing students in small groups to learn together. Under this strategy, groups of students work together to achieve a common goal, rather than working separately and competing with one another. Research has shown that cooperative learning is an effective means of helping students learn a variety of academic and cognitive skills as well as helping them develop positive attitudes toward school and learning. In addition, this teaching approach fosters self-esteem and breaks down prejudicial and stereotypic attitudes. (Johnson and Johnson 1975, Johnson and others 1976, Blaney and others 1977, Johnson and Johnson 1978, Sharan 1980, Johnson and Johnson 1981, Slavin 1982, Slavin, Madden and Leavey 1984, Salend and Sonnenschein 1989) The approach was developed largely through federally sponsored research conducted at Johns Hopkins University. This teaching strategy has been reported to be employed in more than 30,000 classrooms throughout the United States.

Legislative Studies

Between 1976 and 1988, the National Institute of Education and its successor, the Office of Research, sponsored a series of legislative studies in collaboration with the National Conference of State Legislatures. These studies were designed explicitly to lead to the development of informed state education policies. Over this period, sixty-nine studies were conducted in more than forty states and territories. The studies covered a wide spectrum of issues, ranging from school finance in Arkansas, to early childhood education in Nebraska, to education and economic growth in Illinois, to higher education finance in Washington. Often, substantial reforms could be linked to the studies. For example, in the late 1970's Kansas enacted the majority of recommendations of its school finance study; likewise, in the early 1980's Arkansas enacted the major recommendations of its school finance study. Oklahoma's study led tc an improved method for reporting revenues and expenditures; California's work led to a statewide conference on teen pregnancy; North Carolina enacted the major provisions of its study on financing special education; and Utah, based on its study, developed a pupil-weighted finance system. As a result of the study in Florida, the state modified its merit schools program; Minnesota developed teacher centers

for professional development, based on its study; the Tennessee study helped inform the development of the career ladder in that state; and the Vermont legislature, based on its study, allocated funds for telecommunications in schools. (National Conference of State Legislatures 1988)

LESSONS LEARNED

This closing section explains why contributions of research to practice are often overlooked and discusses the potential of research to inform education policy development and practice.

THE LONG AND WINDING ROAD

The road between research and practice in education is often long and winding. As a result, ultimate users may be very aware of the application of a particular policy or practice, but they may not be aware of its origins in research. Consequently, for example, when teachers are asked if they use research, they may well say no. As an illustration, recall that the research-based practice of "cooperative learning" has been implemented in more than 30,000 classrooms across the country over the past decade. I doubt that many of the 30,000 teachers who are using this pedagogical tool would report that they are using research to improve practice. But, in fact, they are. Similarly, policymakers who adopt successful strategies from other states are likely to cite the original state practice as the foundation of their policy. However, the practice in the original state may have emerged from research.

The textbook provides a another example. We know that the textbook is the primary teaching tool of virtually every teacher in this country. Textbooks determine, in large part, what is covered, how much depth each topic receives, and the order in which material is presented. Increasingly, textbook publishers are working with researchers to assure that the material presented is geared to the developmental stages of students and the material is presented in a manner that is likely to be most productive. Surely teachers are using these texts; however, I doubt that many of them are likely to report the influence of research on the structure and content of those textbooks, and hence, the impact of that research on what goes on in their classrooms.

A final example of the way that research winds its way into the classroom is provided by a research-based report on reading. As noted above, the research-based guide on teaching reading, Becoming a Nation of Readers, was used in a number of workshops. Consider, then, the following chain of events: (1) research is conducted and a publication is produced; (2) the publication

serves as the basis for a workshop for reading specialists; (3) the reading specialists return to their districts and train classroom teachers; and (4) classroom teachers revamp their methods for teaching reading.

Here, again, we have an example of research clearly leading to changes in practice. But the chain of events has so many links that the classroom teacher is unlikely to appreciate the initial role of research in the process. All she may know is that she received training and it seems to work.

The point is, research does impact on education policy and classroom practice. However, the indirect way that it comes into the statehouse or the local classroom may mask its presence.

REACHING THE POTENTIAL

Lorraine McDonnell, a particularly experienced student of the education policy process, notes that policymakers, especially at the state level, are extending the focus of their concerns. They are moving from a focus on budgetary matters to issues more directly related to teaching and learning:

> One of the most striking characteristics of state education policy over the past 3 or 4 years has been the extent to which its substantive direction has been shaped by governors and legislators, rather than by education specialists such as chief state school officers. Those in general government who traditionally focused almost solely on the allocation of fiscal resources to schools are now enacting policies that directly affect the substance of education -- what is taught and who teaches it. (1988, p.92)

She points out that as a result of this shift in responsibilities, education policymakers are using research more than ever before:

> One effect of this new focus is that research-based information on student learning and school organization has entered the policymaking process in much greater volume than in the past. Recent policies on preschool programs, curriculum alignment, and effective school processes represent several prevalent examples of research findings translated into policy. (p.92)

McDonnell (1988, p. 93) argues that research can inform policy in at least three distinct ways: by providing a general framework for thinking about policy; by defining a policy problem and identifying potential solutions; and by assessing the feasibility of prospective policies or the implementation and effects of existing ones.[4] She cites the implementation research as an

example of research that influences the general strategies policymakers now often employ. (Berman and McLaughlin 1975) Education policymakers no longer tend to assume that mandates will necessarily be faithfully executed; they now attend to issues designed to assure effective implementation, such as involving stakeholders in the design of programs or monitoring outputs and leaving the determination of process to those who are responsible for delivering services to students.

McDonnell cites A Nation at Risk as an example of a research-based publication that defined a problem and suggested solutions.

> The commission [The National Commission on Excellence in Education, author of A Nation at Risk] sponsored a number of papers that synthesized existing educational research. It used them and a variety of indicator data (e.g. from the Scholastic Aptitude Test and the National Assessment of Educational Progress) to define the problem as one of declining achievement, resulting from students taking fewer academic courses, spending less time in engaged learning, and being taught by less competent teachers. The major policy solutions derived from this assessment of the problem were increased course requirements for high school graduation, a longer school day and year, and performance-based compensation for teachers. (p.94)

The systematic analysis of policy options and effects is traditionally the domain of policy analysts. Such studies are particularly scarce. Cohen (1985) recently surveyed governors' education aides, legislators, chief state school officers, and members of state boards of education. He found that respondents in all roles reported a paucity of adequate information on implementation strategies, the cost and fiscal consequences of various policy options, and the likely impact of proposed policies on student populations at greatest educational risk. Similarly, Florio and others (1979) interviewed Congressional staff dealing with education issues. The information most wanted by these individuals, and not presently received, relates to the impact of program and policy effects, especially student achievement data. They also want information on administrative burdens as well as cost/benefit analyses.

McDonnell's views are consistent with the findings of Mitchell's study of the impact of the social sciences on the development of education legislation in three states: Arizona, California, and Oregon. Mitchell concludes:

> (1) Social science expertise is more widely used than generally appreciated. It is of special interest to newer professional staff members and to legislators who think of their policy-making responsibilities as a full-time occupation.

> (2) Policy-makers differ in both their inclinations and capacities to utilize social research and evaluation findings. . . .
>
> (3) Social-science utilization serves both intellectual and social functions. Intellectually, it serves to conceptualize and interpret cause and effect relationships. Socially, it shapes the development of support groups or coalitions and controls access to legislative debate. (1981, p. 135; See also Quie 1979)

The point is, research impacts policy in a number of ways. In some cases, the research provides a general framework; in some cases, it helps define the problem and find solutions; and in other cases, it analyses the feasibility and effects of policy options. Research is most likely to be helpful if (1) it focuses on issues of interest to policymakers at that particular time; (2) it presents information in a manner that can be readily translated into action; and (3) it anticipates and overcomes problems that might inhibit its use.

SUMMARY AND CONCLUSIONS

Education policymakers and practitioners are dealing with increasingly sophisticated issues. As a result, they are turning more and more to research for guidance. Research has played an important role in the development of education policies at the Federal, state, and local levels of education.[5] This paper has provided examples of how research has been used as a policy guide in a number of exemplary states and organizations. The paper has provided evidence of the impact on policies of the effective schools research, of studies related to higher-order thinking, and of research related to early childhood education. The paper demonstrated how research provided the intellectual foundation for three recent major education reforms: raising student standards, evaluating teacher quality, and restructuring schools. The paper also provided numerous examples of particular policies and programs that are explicitly grounded in education research.

This paper has demonstrated the potential of education research to improve educational policy and practice throughout the United States. Nonetheless, the contribution of education research to practice can be improved. We must find better ways to harness the intellectual energies of more of our country's top scholars to focus their efforts on improving our nation's schools. We must find better ways of building a knowledge base that readily informs practice. And we must find better ways to place the fruits of research in the hands of those who can help make our education system, once again, the best in the world.

RECOMMENDATIONS

1. THE EDUCATION RESEARCH AND DEVELOPMENT SYSTEM **MUST FOCUS ON ISSUES OF NATIONAL CONCERN**

The policymakers and practitioners who rely on research to help guide educational reform represent a national constituency. These individuals are most likely to view the research and development system as valuable and useful if the system focuses on issues of national concern. One way to assure this focus is to develop a systematic, open, client-based planning and governance mechanism for, at least, the federal component of the education research and development system. This would involve deliberately involving **users** of research in all stages of the research and development process -- planning, design, execution, and dissemination. (This deliberate involvement of clients requires exactly the same type of decentralization of decisionmaking that is currently being promoted in our nation's schools and businesses.) When users are involved, the work is most likely to focus on important, practical, and timely issues; when users are involved, they develop a sense of ownership over the results and are likely to put the research to good use; and when users are involved, they start thinking of new ways to use research to guide improvement of our nation's schools.

2. THE FEDERAL EDUCATION RESEARCH AND DEVELOPMENT SYSTEM MUST BE BETTER **COORDINATED** IN ORDER **TO BUILD A COMPELLING KNOWLEDGE BASE**

Policymakers and practitioners are most likely to have faith in a research finding when it is confirmed and reconfirmed by a body of supporting studies. Seldom can a single study in the field of education (or in any of the fields covered by the social sciences) isolate a single treatment with confidence. Confidence is cultivated by the development of a series of confirmatory studies that corroborate a particular finding and help isolate the important characteristics of a particular approach. Therefore, a number of activities, such as grants competitions and demonstration programs, should be coordinated (and perhaps tied to the planning process described above) to yield a convincing set of studies that establishes and confirms useful research-based policies and practices. Clients can then use these findings with confidence to improve our nation's schools.

3. WE MUST FIND BETTER WAYS TO **TRANSLATE RESEARCH INTO PRACTICE**

Physicians regular revise their practices based on current findings from medical research. We must provide teachers (and other practitioners and policymakers) with the time, training, and incentives to make similar use of research to improve educational practice. We could promote the constructive use of research by assuring that major education research findings are

published in the popular media as well as in scholarly journals. When the general public learn of the potential of reforms, pressure will be brought to bear to assure that these reforms are put into practice. We could promote the constructive use of research by supporting the current movement to increase authority and responsibility at the school site. When local practitioners are afforded control over the conditions of their work, they will have the means and the incentives to improve those conditions. Research provides one source of guidance for reform. Finally, we could promote the constructive use of research by sponsoring and publicizing demonstration sites where researchers and practitioners work together to solve particular practical problems. When working with practitioners, researchers tend to focus their skills on solving problems; when working with researchers, practitioners tend to frame their problems in ways that can be helped by research.

By building an integrated community of scholars and practitioners, we could develop a solid, useful stock of research knowledge. That knowledge, in turn, could then readily be translated into policies and practices that further improve the American education enterprise.

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Notes

1. I am grateful to the many respondents who provided valuable examples of the use of research to improve practice or policymaking. I also appreciate the advice of Betsey Ashburn, Betty Demarest, John Egermeir, Steve Kirsner, Ivor Pritchard and especially Susan Fuhrman, who provided valuable suggestions about writing this paper. Terry Hartle provided particularly helpful comments on an earlier draft of this work. Anita Madan provided valuable research and especially helpful editorial assistance. This paper focuses on the contributions of research to education policy over the past 10 to 15 years. As a result, it does not cover, for example, such important contributions as the impact of the 1966 Coleman Report on the development of state and federal compensatory education programs or the impact of the desegregation literature on the integration of America's schools. (Note: the Coleman Report and many of the desegregation studies were supported by federal funds.) This paper presents the personal views of the author. It does not necessarily represent the positions or policies of the U.S. Department of Education.

2. Chapter 2, Title I, of the Elementary and Secondary Education Act of 1965, as amended by P.L. 100-297, the Augustus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988. Chapter 2 is the Federal education block grant program. Effective Schools provisions are also contained in Chapter 1 (compensatory education program) of the Elementary and Secondary Education Act utilizing a nearly identical definition to that for Chapter 2.

3. The Kaufman Assessment Battery for Children was used to assess cognitive development. Participants performed particularly well on the achievement scale of this instrument, the measure designed to predict school-related success.

4. This perspective is consistent with Wirt and Mitchell's (1982) view of the stages of the policy development process. They identify four stages: issue emergence, policy option deliberation, making the policy decision, and performance oversight. They also identify four types of policy relevant research. **Descriptive** research emphasizes the development of categories for classifying social events and processes. **Explanatory** research involves the creation and testing of hypotheses regarding the causes of social events. **Critical** research focuses on comparative analyses of different policy strategies and/or policy goals. **Forecasting** research enables researchers and policy makers to project or predict future

consequences which will follow from changing social policies or conditions.

5. This paper focuses on the relationship between research and education policies and practices. The explicit examination of the relationship between research and improvements in student achievement lies beyond the scope of this work. However, this study represents a first step toward that latter examination. As future studies investigate the relationship between policies and practices and student achievement, the link between research and student achievement will become more fully understood.

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