THE USE OF EXISTING DATA BASES IN PROGRAM EVALUATION AND SCHOOL IMPROVEMENT

Leigh Burstein

CSE Report No. 229

1984

CENTER FOR THE STUDY OF EVALUATION
UCLA Graduate School of Education
University of California Los Angeles

The project presented or reported herein was performed pursuant to a grant from the National Institute of Education, Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education, and no official endorsement by the National Institute of Education should be inferred.

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This report discusses current practice in the use of existing data bases in program evaluation and school improvement and explores directions for increased and improved uses in local school districts. Local district maintenance and use of data archives is quite limited, and so we rely to a great extent on experiences in areas outside of education where multipurpose data use is more common, and on national and state rather than local practices in education. We assume that current efforts in information maintenance and use in local districts is more a reflection of competing priorities and limited technical expertise and support than a conscious judgment that there are no further benefits to be accrued. Therefore, at a time when pressures for school improvement are strong, and information technology resources are expanding and becoming more cost effective, it seems appropriate to consider possibilities for improved information use.

SOCIETAL CONTEXT

Both recent history and current events regarding public interest in education suggest why information maintenance and use by school districts is of interest. Consider, for example, the issue of possible test score decline and its reflection on the quality of schooling which received substantial national attention in the mid 70's. Commentators noted and lamented the apparent decline in performance on the Scholastic Aptitude Test (SAT). Higher education spokespersons were concerned about pre-college preparation and the increasing costs of remedial instruction that had to come from their stagnant or shrinking bases of support. Industry's dissatisfaction with the entering skills of the work force was publicly expressed. In each of these cases, the failure of schools to prepare students

academically to participate fully in society was viewed as a primary cause of the perceived decline in competence.

Recognizing the need for better data to inform public policy, the federal government and private foundations supported several inquiries to investigate the following questions:

1. Was the apparent test score decline real or artifactual?
2. If the decline were real, how widespread was it?
3. If the decline were real, what were its causes? To what degree could it be the result of changes in the secondary school curriculum in the early 70's (away from traditional courses toward greater diversity and "relevance"), of structural changes in expectations regarding the role of schools (equity, diversity and excellence considerations), and of broader changes in the society at large (changing nature of the family, more single parent homes, more homes with all adults maintaining full-time jobs outside the home, increases in television viewing).

Several reports (Harnischfeger & Wiley, 1975; The Wirtz Commission, 1977; Munday 1976; and the National Academy of Education, 1977) examined the issue of decline in detail and provided a more balanced picture of its extent and its possible antecendents. These studies generally concluded that the decline was not solely the fault of schools since other societal institutions and norms had shifted as well. Their conclusions were largely based on available data gathered from SAT and ACT records, evidence from state assessments, and from scattered research studies that focused on specific aspects relevant to the test score decline issue.

Decidedly absent in the test score decline debate were contributions from local school districts. Despite a history of annual achievement testing (extending back before the mid 60's compensatory education efforts) and a large expansion of local research and evaluation offices and expertise during the late 60's and early 70's, LEA's were ill-prepared to contribute to the dialogue. Most districts were unable to document whether the national trends evidenced in the various policy reports applied to their local situation. Instead, they simply had to take the blame along with the rest of the nation's schools.

The mid 70's test score decline debate is one instance in which local schools were unable to respond to concerns about existing practice and performance. Now major national commission reports on the state of education (e.g., from The National Commission on Excellence in Education, 1983; the National Science Board Commission on Precollege Education in Mathematics, Science and Technology, 1983; the Twentieth Century Fund, 1983; and the Education Commission of the States Task Force, 1983) are again placing the spotlight on problems in schools and the needs for educational reform. The question is whether LEA's will be better able to play an active role in documenting the reform efforts and their consequences than they were previously.

To a great extent, the ability of LEA personnel to participate depends on the extent to which they are able to <u>use existing data to guide the evaluation of local programs and inform instructional improvement efforts</u>. At present local school uses of information tend to be responsive and targeted rather than reflective and

multifaceted. Schools routinely collect substantial amounts of data about the backgrounds, education, interest, performance, and attitudes of their students, the employment careers of their personnel, the demography of their community, and the characteristics of their educational program. Yet, except for compliance reports for special programs, and in some cases monitoring of local school performance, districts seldom retain information across years, use data for purposes other than for which they were originally collected, or attempt to integrate diverse sources of information into a comprehensive, interlocking system. The question, then, is whether information collected (and in some cases maintained) by local schools can serve a broader array of educational purposes and contribute to improved understanding of the continuities and changes in educational systems and their consequences for society.

CURRENT GENERAL PRACTICES

There is certainly no shortage of models for broad-based maintenance and use of available data. Virtually all aspects of American society claim to be data oriented in their decision-making. In business and industry, substantial resources are devoted to financial analysis, economic forecasting, and marketing studies. Medical and health care professionals rely heavily on epidemiological data to target areas of necessary research, to guide practice, and to monitor services and cost information. Opinion polling and analyses of trends from ongoing elections and social surveys have become increasingly central to the political process (e.g., in election strategy and establishing voting district boundaries). Government agencies rely heavily on information collection, maintenance, and

analysis for monitoring and planning.

Throughout the social and economic sciences, researchers and policy analysts make extensive use of data collected from major social, political, and economic surveys. U.S. Census data, the General Social Survey, National and Congressional Election Surveys, the Criminal Victimization Survey, and the Current Population Survey are examples of primary information resources broadly investigated by social scientists. Data from social experiments such as the Negative Income Tax Experiments and the Health Insurance Study also undergo diverse examination and re-examination. The major investigations in virtually all areas of social inquiry generate data bases that are deposited in archives such as those at the Inter-University Consortium on Political and Social Research (University of Michigan), the Roper Center (University of Wisconsin), the National Opinion Research Center (University of Chicago), and the National Bureau of Economic Research.

The archiving and use of existing information resources is deeply ingrained in social research and policy analysis. But thoughtful and informative examinations of how data archiving and usage could foster more uniform standards and expectations and expand the array of social information available for further inquiry are rare (an early exception is a book by Gottlieb & Borodim, 1973).

The lack of guidelines has been remedied somewhat recently by the willingness of various government agency archival and policy analysis specialists to share their experiences and insights with the social research community. A primary example of a new resource in support of

improved practice is the compendium on reanalysis of program evaluations edited by Boruch, Wortman, and Cordray (1981). This book contains chapters on the Federal Statistical System, The National Archives, The National Institute of Justice's Access and Secondary Analysis Policies, and the U.S. General Accounting Office's reanalysis activities. It also contains a summary of resources for locating public and private data, a description of archiving procedures, chapters on pertinent analytical issues in secondary analysis, and examples of issues where reanalysis serves an important research or policy purpose. The descriptions of the range of national efforts to maintain and use data resources is especially pertinent to those areas such as education which have only recently begun to establish archiving and usage policies.[1]

CONDITIONS IN EDUCATION: NATIONAL AND STATE PRACTICES

Until the mid 70's, the record of archiving and conducting secondary analyses of data from large-scale educational surveys and evaluations was quite thin. Notable exceptions were the Equality of Educational Opportunity Survey (the basis for the Coleman Report), Planned Variation Head Start, The IEA Six Subject Surveys, and Project Talent Survey. Otherwise, the data bases from most large-scale educational investigations were used only for the initial inquiry or perhaps for follow-up research by the original investigators, and in many

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[1] One irony of the current status of archival and usage policies in education is that the National Institute of Education supported basic conceptual work on multiple uses of existing data (e.g., Burstein, 1978; Hendrick, Boruch, & Ross, 1978). In fact, the Boruch et al book cited in the text was developed under NIE sponsorship.

cases no provisions were made for retention and maintenance of data resources.[2]

For a variety of reasons, the situation changed so that multiple uses of existing data bases in educational research, evaluation, and policy efforts is now more prevalent. The impetus for the change may have been efforts by the major federal agencies supporting educational research and evaluation to make better use of resources developed under their auspices. The National Institute of Education has been active in this area. Specific examples of recent NIE practices regarding data archiving, maintenance, and usage will help to characterize the trends:

- In its Compensatory Education Study to assist in the reauthorization of ESEA in 1977, NIE commissioned several policy studies which required analyses of existing data on, e.g., the consequences of shifting to achievement-based versus poverty-based criteria for eligibility for service. At the time, the task of pulling together diverse data bases from various states and government agencies was complicated and costly. Nonetheless, the political payoff from the study signaled other agency personnel of the advantages of maintaining information resources for future policy studies.

- The Secondary Analysis Project was supported at Northwestern University to accumulate data sets from major education investigations and undertake secondary analyses to confirm or clarify their findings. The contract also supported the publication of a collection of papers (Boruch, Wortman, Cordray & Associates, 1980) on the state of the art in reanalyzing program evaluations. (See earlier description)

- A grants competition was conducted to encourage secondary analyses of data from the National Assessment of Educational Progress (NAEP) (e.g., Harnisch & Linn, 1981).

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2 This account ignores long established efforts in post-secondary education to maintain information bases for further research and policy analysis. For example, the Cooperative Institutional Research Program has been conducting surveys on entering freshmen since the mid 60's under the auspices of the American Council on Education.

- The contractor for the Beginning Teacher Evaluation Study (BTES Far West Laboratory) was commissioned (under separate agreement) to create a data bank and accompanying documentation for follow-up investigations by other researchers. The data were deposited in the National Archives and also placed in the ICPSR data archives. Subsequently, BTES data have been used in secondary analyses of both the primary issues in the original investigation (e.g., Brown & Saks, 1983) and secondary issues for which subsets of the BTES data were relevant (e.g. Burstein, 1980; Maddahian, 1981; Miller, 1981: Webb, Shavelson & Maddahian, 1983).

- The competition for the 1982 award of a new contract for the National Assessment of Educational Progress (now managed by NIE) placed increased emphasis on the development of NAEP as a data archive for analysis of educational policy and practice. It is generally believed that the poor track record of the Educational Commission of the States in developing NAEP as a national resource for policy analysis and the central role of just such a purpose in the proposal from the Educational Testing Service was a major factor in the award decision.

- The initial development of methodology for quantitative integration of analytical data from multiple studies (usually termed meta-analysis or quantitative synthesis) was almost entirely sponsored by NIE (Glass, 1977; Light, 1978). This methodology is now widely used in education and has the secondary benefit of encouraging better maintenance and documentation of primary research data and highlighting problems with existing practices in data collection and reporting.

In recent years, the National Center for Educational Statistics (NCES) has also become more active in ensuring access to and use of education data bases. Data from the NCES-sponsored National Longitudinal Study (NLS) of the High School Class of 1972 have been frequently used in secondary analyses of education's mediating role in the status attainment process. The more recently sponsored High School and Beyond (HS&B) Study is already widely investigated by researchers interested in educational policy, most notably in the debate on the relative effectiveness of public and private schooling.

In addition to the original report by Coleman, Kilgore and Hoffer (1981), there have already been special issues of Harvard Educational Review and Sociology of Education stimulated by Coleman et al and reporting secondary analyses and reanalyses of the HS&B data. NCES has further encouraged usage of both the NLS and HS&B data through the in-house development of data archives and documentation for public release and the circulation of frequent updates and bulletins about these archives. They also recently commissioned secondary analysis of HS&B data to identify effective high school practices. Currently, NCES is taking steps to support the creation of data archives from the Second International Mathematics Study (SIMS) and ensuring that these data are readily accessible for analyses beyond the original span of interests reflected in the study.

There has been a similar emergence of data archival and multi-purpose usage by state education agencies. State assessments, originally developed for general and local system monitoring, are increasingly used in investigating the impact of new programs introduced by the states, in applied research on the characteristics of effective school programs, and in policy analyses of educational trends and their consequences.[3] Various state educational programs are beginning

[3] We need not look beyond the California Assessment Program (CAP) to convey the possibilities in use of state assessment data. CAP data have been used in evaluating the impact of a state-developed early childhood education program (e.g., Baker, 1976; Isaacs, 1977); in assessing the effects of compensatory education services offered in the state (California State Department of Education annual reports on evaluation of consolidated application programs (Title I, EDY, Miller-Unruh, ECE); in an effective schools study (California State Department of Education, 1976); and in policy studies of the effects of curriculum changes and television viewing habits on student performance (Harnischfeger & Wiley, 1982).

to coordinate their data collection efforts to avoid redundancy where possible, and data archives are being established to ensure ready access to the information collected.[4]

Clearly, national and state educational efforts to develop, maintain, and encourage use of existing data resources are evolving. The gap between education and other areas of social research and services, in both data resources and expertise in their maintenance and use, is narrowing. Attitude is shifting from a position that questions why one would want to create data archives and encourage secondary analyses to one that asks how to best do so. Every major report of the state of education calls for greater attention to the need for constant maintenance of existing information.[5] The major

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[4] Again the change in circumstances in California is illustrative. As part of an evaluation of the California Early Childhood Education Program CSE (Keesling & Burstein, 1976) staff requested historical information on program participation, characteristics, and performance for a three-year period. At the time, it took approximately 12 separate data bases to fulfill the request. In essence there was no single data base indicating which schools had participated in various compensatory education programs over the previous three years and documenting school practices and performance. Also each year the state constructed a new, separate file from its consolidated application reports with no cross-checking with the previous year's school characteristics and no attempt to link performance over time at the school level. In the recent years, however, the California Basic Education Data System (CBEDS) was established to routinely collect basic information on student enrollments and staff members for use by program personnel at the state and local level, and to maintain ongoing information about these aspects of the state's public schools. Other efforts have been instituted to ensure that up-to-date longitudinal information on programs is now readily available.

[5] For example, the report of the National Science Board Commission on Precollege Education in Mathematics, Science and Technology recommends that

> The Federal Government should finance and maintain a national mechanism for measuring student achievement and participation in a manner that allows national, state, and local evaluation and comparison of education progress. (1982, p. vi)

education agencies at the federal and state levels are taking seriously their responsibilities.

Researchers and evaluators are calling for policies to develop, maintain, and encourage multipurpose data usage from sponsored research and evaluations and pre-planned secondary analyses (Boruch & Cordray, 1980; Boruch et al, 1980; Cook & Gruder, 1978, Cronbach et al, 1980; Raizen & Rossi, 1982; Reisner, Alkin, Boruch, Linn, & Millman, 1982). Evidently, there is hardly anyone left to convince at the national and state level (except selected self-interest primary data analysts) that multiple uses of often expensive educational data is wise and sensible educational policy and practice, especially at a time of highly visible competing demands for scarce educational dollars.

LOCAL CONDITIONS IN EDUCATION

Local school districts are a long way from making full use of information from their recurring data collection activities and of the improved computer technology for storage, manipulation, and access to data. However, since LEA's are even more sensitive than state and federal agencies to economic conditions, and thus have reasons to become more cost conscious in their information gathering activities, it is reasonable to anticipate growth in multiple uses of existing data in local settings as well.

In most cases, current conditions in LEA information usage practices are hardly enlightening or exemplary. While almost every district collects standardized achievement test data and uses them for various purposes (e.g., compliance with Chapter I requirements, public

reporting of school-level achievement, transmittal to teachers for instructional purposes, to principals for class formation and monitoring, and to parents for documenting their children's academic progress (See Choppin (1982) and Dorr-Bremme (1982) for details of the CSE study of test use in schools), these data represent only a small portion of the available information collected and maintained in some fashion by school districts. The types of information routinely collected (or collectable) in school districts includes the following:[6]

A. Demographic/Archival
   1. Student demographics--age, sex, ethnicity, home language, parental occupations and employers, eligibility for AFDC, reduced price lunches, medical histories, home address, mobility (how long in particular residence) parental education, family size
   2. Teacher and building-level administrator backgrounds -- age, education, previous employment and educational history, special certification and subject-matter expertise
   3. School building characteristics -- information about physical plant (e.g., age, capacity, particular resources)
   4. Student body and community composition--ethnic composition, neighborhood wealth, community involvement in neighborhood schools (e.g., PTA membership)

B. Financial
   5. Payroll expenditures
   6. Materials and supplies
   7. Equipment
   8. Maintenance
   9. Special programs (e.g. entitlement programs, staff development, remedial services, counseling and guidance)
   10. Transportation
   11. Safety and security

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6 This list is a revision of one provided in Burstein (1983). Also, Sirotnik, Burstein, and Thomas (1983) describe the actual data routinely collected in seven districts. Other studies (e.g., Bank and Williams (1980, 1981), Lyon, Doscher, McGranahan & Williams, 1978; Kennedy, 1982) provide evidence of the data collection activities of school districts in the achievement domain only.

C. Testing
12. Standardized, norm-referenced tests
13. Criterion-referenced testing
14. Minimum competency and proficiency testing
15. Group and individual ability and aptitude testing -- done typically to determine pupil eligibility for special programs and placement decisions
16. Teacher-made tests and curriculum-embedded tests

D. Program Characteristics and Participation
17. Special program participation -- availability and staffing of special programs at local school sites
18. Curriculum information -- curricular packages and texts used in classrooms, topic coverage from continuum (assumed and measured)
19. Course taking patterns -- information from student cumulative records and from prescribed offerings
20. Grading practices -- teacher reports of student grades

E. Student Performance, Participation, and Behavior
21. Grades by content area
22. Participation in extracurricular activities by types
23. Awards -- e.g., scholarships
24. Absenteeism and tardiness
25. Reported disruptive and inappropriate behavior

F. Affective, Attitudinal, and Observation Information
26. Student responses to surveys about class and school environments and other aspects of their educational experience
27. Teacher measures of classroom and school climate and activities
28. School building administrator measures of school climate and activities
29. Parental surveys of perceptions and support of school activities
30. Parental participation in school activities (e.g., volunteers, fundraising attendance at school functions, scheduled conferences)
31. Administrator observations and evaluations of teachers
32. Teacher observations of other teachers
33. District personnel's observation and interviews of building personnel
34. Surveys of graduates to determine occupational and educational status
35. Information about student dropouts

G. District Evaluation Reports
36. Routine annual reports to board and federal and state agencies
37. Evaluation of specific educational changes
38. Instances of local school assistance by type and disposition

The step from simply collecting information to the creation of functioning information systems is apparently a giant one. The fact that the above sources of information are available in school districts does not necessarily mean that they are conveniently accessible or are currently monitored for trends and patterns. There are a few exemplary efforts by districts to establish comprehensive information systems for diverse local use. For example, Cincinnati has had a comprehensive multipurpose information system for years.[7] But most existing efforts are relatively recent responses to instructional improvement and evaluation pressures and again focus almost exclusively on achievement test data.

Functions of Existing District Data

Obviously, the possible functions of existing data are known to some districts. It is unclear, however, how well actual practices in maintenance and use of information systems are documented. Further, the measures necessary to disseminate both the benefits of such efforts and the procedures for implementing them in other districts are not well understood.

It seems more beneficial at this point, therefore, to identify the functions that existing data in local schools can serve if the data are maintained in accessible and documentable form. We will also comment on the conditions pertinent to determining whether these functions can actually be achieved in local educational settings.

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[7] Cincinnati's system is unique in its provision of the information and support mechanisms to serve evaluation needs of individual schools and in its attempts to use this information to decentralize educational planning.

There are at least five possible functions of existing data in local districts, in addition to the direct and immediate uses that dictated their collection in the first place. These functions can be termed long-range planning, pulse monitoring, student decision-making, program decision-making, and informing educational policy. Below we provide brief descriptions of each function to enable the reader to better understand the distinctions among them.

Long-Range Planning. Maintaining information for systematic use in school district planning is a long-established and well-documented purpose. Decisions about school closings, teacher hiring, resource allocation, and the like are typically guided by demographically-based planning models. In many respects the applications that fall under the rubric of long-range planning parallel those in other organizational contexts and, as such, have much more in common with data use in non-educational organizations than they do with other educational applications.

Given its linkage to district-wide policy and its centralized management, it is not surprising that long-range planning usually draws primarily on demographic/archival and financial records. Decisions about school closings, for example, depend on trends in local enrollments, physical chracteristics of the school sites, non-personnel costs (including safety and security factors, local census information about housing stock and about changes in ethnic and socioeconomic composition, birthrates and projections for future growth. If routine community surveys are conducted, information gathered from this source can also be used.

Pulse Monitoring. In districts already operating information systems, the monitoring of data to detect the general well-being of the school system is already common. These monitoring activities focus on district-wide trends in such areas as student performance, graduation rates, attendance rates, truancy, vandalism, grade retentions, and attitudes (students, teachers, parents, community) toward aspects of schooling. This use of existing data constitutes an effort to treat information as "educational indicators" of whether the system is moving in desirable directions. In isolated instances, pulse monitoring is actually carried out at the school building level as well, but much more is possible in this area. Cooley (1983) provides a thoughtful and informative description of the monitoring function in school districts.

Student Decision Making. According to conventional notions of school guidance counseling, cummulative records of course taking, performance (both tests and grades), and interest are used to guide educational decisions of students. With the increased possibilities of computerized maintenance of student educational histories, the possibilities of informed decision making are greatly enhanced. Profiles of trends for individual students as well as normative patterns for peers and specialized cohorts (e.g. median trends for selected set of friends or others with similar educational aspirations) can be generated to assist in the decision-making process.

Program Decision Making. A variety of decisions about programmatic changes can be informed by existing information bases.

Planning for shifts in student interests and capabilities can be enhanced by examining data from students at earlier time points. Course offerings, year-to-year class assignments, and preparation for various post-secondary careers can be improved through analysis of course-taking patterns, performance, and subsequent attainment and educational decisions from prior cohorts. Similarly, existing data can be used to study the consequences of changes in specific programs in individual school sites.

A clear example of how routinely-collected and maintained information could be used for program decision making is seen in the effort to monitor the suitability of curriculum offerings in secondary schools. For instance, to determine whether the particular array of mathematics courses reflects district goals and student needs, a variety of information is likely to be useful. Among the potential sources of information are: information about the distribution of mathematics skills upon entry to secondary schools; the interests and anticipated educational plans of students; the skills believed essential for students to acquire their interests (as defined by district continua, competency, and proficiency objectives, university enrollment expectations); the alignment of special skills to courses; the alignment of various course offerings with each other; the availability of personnel and materials to offer all desired courses. It would also be important to keep track of historical patterns of successful completion of courses (e.g., percentage with C or better, number of students failing specific courses, specific absenteeism from mathematics courses relative to other classes) to decide whether

apparently rational course alignments and expectations about essential skills are realistic and, if not, what can be done to improve matters. Unfortunately, this kind of curriculum monitoring has apparently not occurred routinely. Otherwise, the decline in course taking in mathematics in secondary schools at a time when the demand for technical literacy has increased would have not been allowed to happen. Given the renewed emphasis on a common academic core at the secondary level and the limited demands for data beyond those which are routinely collectable, this area of information use for program decision making will surely increase in coming years.

Informing Education Policy. Once information systems and data banks in local districts become commonplace, it should be possible to use them to contribute to the dialogue on state and national policies about the status of education and the needs and mechanisms for improvements. Questions of changes in student performance, community attitudes, student interest, curriculum shifts, etc., derived from local information systems can be investigated for patterns of local reaction to issues of national and state interest.

Other Possibilities. Two aspects of the designated functions warrant further comment. First, each of the functions identified typically serves a specific clientele within the educational system. Long-range planning is targeted to district-wide management, and falls primarily under the auspices of the administration to serve the superintendent's efforts to support his or her educational policies. Pulse Monitoring as described here is targeted more at the political

community surrounding local education as represented by the school board, local media, and community leadership. The primary constituents for student decision making (students and their parents) and program decision making (teachers and buildings administrators) are obvious, though the consequences of the decisions serve a wider array of secondary constituents (local business and industry and post-secondary institutions in the former and students and district administration in the latter). The clients for the last function virtually exhaust the nation's citizenry through the consequences of informed educational policy for students and their parents, for educational professionals, and for the nation's industries, institutions, and individual taxpayers.

Second, we have purposely excluded two ubiquitous functions from our list. Neither research nor evaluation has been explicitly mentioned. The availability of information systems in school districts can facilitate better research on many educational issues. But it is the secondary benefits that accrue from attempts to serve other functions that provide both the impetus for educational research in schools and often the directions for its improvement. To develop local information resources for purely research purposes runs the risk of creating artificial barriers to the informed data use under the mistaken belief that such information surely would not also be useful for decisions about educational policy and practice.

The avoidance of evaluation as a function is an attempt to move away from conventional reliance on such data for summative judgements

of program impact, especially at the school and district level. Notions of formative evaluation are closer to what is possible with existing data, but even this term is limiting. Each of the functions identified above relate to some degree to educational decision making and description. As such they reflect common aspects of classical evaluation principles and models. Yet we view educational processes in local educational settings as dynamic, constantly evolving, and shifting (though often slowly) between various notions of the worth and purposes of education and responding like other social organizations to both the characteristics of the organizational structure and the personalities and intentions of its participants. In such circumstances, it seems best, on the one hand, to characterize any activities worthy of the rubric "evaluation" as systemic, to convey their interwoven, ongoing, and fluid nature or, on the other hand, to eschew evaluation terminology altogether to avoid static or formal application of evaluation methodology in contexts where it is inappropriate.

Necessary Local Resources

The functions described above fall within the realm of possibility given the intellectual and technological potential for the creation, maintenance, and analysis of information already in evidence in society at large. While there are short-term limits to the practicality of certain functions of existing data in school

districts,[8] none of the necessary conditions are intractable with sufficient economic resources and interest.

What local school districts seem to need are the following:

1. A general commitment from the participants in the educational community to the value of existing data for informed inquiry and educational change.
2. Sufficient computer and data literacy on the parts of students, teachers, administrators, and parents to benefit from the availability of data suitable for informing educational decision-making of all kinds.
3. Computer hardware and software capable of providing ready and timely access and linkage to information for personnel at the school and district level along with the facility for information transferral to agencies external to districts for broader policy analysis efforts.

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[8] For example, the key to a viable function of local information systems for informing broader national and state policies is finding the right balance between comparable reporting categories for multi-district examinations and tailoring information to local needs. It is obviously easier to aggregate across test data when districts use the same tests administered at approximately the same dates. But this is not a sensible approach to obtaining data maximally useful for local needs and decision-making. Similarly, while uniform categories for vandalism, truancy, etc., might be desirable for long-term monitoring of national trends, the nature of these manifestations of local school problems is likely to be quite different for schools in urban central-city, suburban, and rural/small town settings. Further work is desirable to determine how to develop routine reporting mechanisms that do not place too great a demand for across-district conformity yet are viable for cross-district policy analyses.

4. Sufficient computer and data management and analysis expertise in school districts (or in networks of school districts) to create, maintain, and analyze data archives, and software (including data analysis programs) capable of manipulating data to facilitate multiple uses and accomodate multiple users.
5. Sufficient safeguards to ensure protection of personal privacy and to assure persons whose information is maintained that their privacy is protected.
6. A healthy and informed understanding of the limits as well as the possibilities of information-based decison making.

Certain aspects of this list warrant further comment. The "resources" required cover the range from technological to attitudinal. Certain levels of expertise are obviously necessary as are certain amounts of technology. However, three of the resources listed are essentially attitudinal or dispositional. Individuals affected by the availability and use of information have to believe that information can matter (that it can be helpful), have to be secure from unwarranted invasion of their personal privacy (that information will only be used to serve personal and public educational interests) and need to maintain a healthy scepticism about data-based judgments (the imperfections and margins of error inherent in any data-based decision). These attitudinal resources are seldom sufficiently valued by those urging improved information use, and they are seldom actively cultivated in educational organizations implementing information

systems. One wonders what the marginal benefits and costs would be to actively pursue improvements in these areas.

The area of computing resources, related directly or indirectly to points two through four, could also benefit from further elaboration. Currently, there are a variety of efforts to seek to incorporate computers as a common multifaceted component of the nation's schools (e.g., National Science Board Commission on Precollege Education in Mathematics, Science, and Technology, 1983; also efforts to provide tax credits for donations of computing equipment to schools). Educators are just beginning to understand how complicated decisions about computing in education can be and they are beginning to acquire a sense of the costs of insufficient planning for computing needs and practices (Becker, 1982a, 1982b; Walker, 1983).

While it may be some time before sufficient computing resources and expertise are available to provide direct instructional access to all students, enough computing equipment is probably already available to create comprehensive information archives in school districts. Most districts already operate main-frame computing machinery which, with suitable hardware and software, can be linked to relatively inexpensive micro-computers at each of its schools. This linkage will place information resources in the hands of building personnel, and also foster opportunities for improving timely information transfer to and from district information banks.

Within a few years, there will be a sufficient number of exemplary on-line information systems operating in school districts to

facilitate a major dissemination and diffusion effort through regional educational agencies. Problems of technology transfer and adjustment to new information environments will undoubtedly remain. But if the short-term evidence on the general acceptance of computer literacy as an important skill for all students is any indication, it will be more a matter of working out the mechanisms for successful implementation than justifying the value of the capability. School systems around the country are ready to improve their use of information technology. All they need now are the means to do so.

CONCLUDING COMMENTS

This paper is essentially an essay on how local schools can make many uses of the information they collect and what conditions need to be established to allow them to successfully accomplish this task. As the local schools adapt to the explosion in interest in computers and technology, the kind of information system we envision will be a natural component of the district's capabilities. Thus, better use of existing information and better preparedness to anticipate and respond to concerns about the well-being of our educational system can be a natural by-product of "educating Americans for the 21st Century".

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