Indicators of Student Success

State Board of Education

1998 Report

DISCUSSION COPY

State of Iowa
Department of Education
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A Message from the Director to the State Board of Education

Two years ago at the State Board Retreat, as we discussed the progress being made on strategic plan activities, you asked two critical and interrelated questions: "What difference does any of this make?" and "Do we have any evidence to show that what we are doing is having a positive impact on student achievement?" The ensuing discussion was a turning point for education in Iowa. It was a shift in focus from process to results. It was a commitment to accountability. As a result of that discussion we restructured the strategic plan to build in a mechanism for answering these important questions. This mechanism, called Indicators of Student Success, is designed to hold all of us in the education community accountable.

With Indicators of Student Success, we committed ourselves to collecting information statewide on core indicators of student performance, student behavior and success beyond high school. In addition, school districts would be required to use multiple methods for assessing progress toward their locally established student achievement goals and for reporting back to their communities. Furthermore, we developed strategies for building a structure that would support this local effort.

In order to implement this we sought and are using two new pieces of legislation. The first, AEA accreditation, gave the State Board of Education the tools to set up a structure of statewide assistance to local school districts to improve instruction and assessment practices. The second piece of legislation, passed during the 1998 session, gives the State Board the authority to incorporate accountability for student achievement into the standards for local district accreditation. It does this by directing the State Board to write rules that identify a set of core indicators and require that local districts report annually on these indicators. School districts must also demonstrate the use of multiple assessment measures in determining student achievement levels.

The purpose of this report is to provide data and supporting descriptive information about selected indicators of student success in Iowa – to start to answer the questions, "Does any of this make a difference," and "Are we having any impact on student achievement in Iowa?" It is also meant to be a starting point for a discussion of the rules to be adopted by the State Board for the new LEA accreditation process. In these rules we want to identify indicators that can be used to describe the current status of student achievement, monitor the effects of school improvement over time, provide direction for policy development and encourage districts to set and meet high educational standards.

In the Board's retreat discussions, we will be looking for your reactions to some of these suggested indicators. It is our intent to return to the State Board this fall with a recommended set of indicators for approval. These indicators would then be approved <u>again</u> with the rules for LEA accreditation. The initial fall action by the State Board will allow districts to plan their data collection a year in advance so that they can move immediately into the new accreditation process.

Introduction

Iowa school districts are mandated to establish goals to improve student achievement and performance. Through the Department of Education's state accreditation process, each school district will be held accountable for the establishment of student learning goals. The *Code of Iowa, Chapter 280.12* and *Chapter 280.18*, requires local community committees to provide assistance and direction in the establishment of student achievement and performance goals. It is the responsibility of the local school district to implement short and long-range plans to meet these goals and establish the desired levels of student performance.

While the desired level of student performance is set through the local community, three distinct levels must be established for grades 4, 8, and 11 in reading and mathematics. The attainment of the desired level of pupil performance is determined through the use of periodic assessments, using various testing measurement instruments, including standardized tests. These assessment techniques are used for all Iowa students. *Chapter 280.12* and *Chapter 280.18* of the *Code of Iowa* requires annual reporting of continuous progress toward meeting the desired levels of student performance and achievement to the community, the local advisory committee and to the Department of Education.

Existing efforts are being strengthened with recent passage of state legislation, House File 2272, which requires incorporating accountability for student achievement into the standards and accreditation process to measure academic achievement and student performance. The use of core indicators of student performance and achievement for state level reporting is also required. House File 2272 provides for the reporting of progress made in attaining student achievement goals.

Locally identified indicators will be one of the ways school districts will monitor the success of their school improvement efforts and report the continuous progress in student achievement and performance to the public, their community and the Iowa Department of Education.

The Iowa State Board of Education and the Department of Education have identified categories of statewide indicators to document improvement in student performance, student behavior and success beyond high school. These indicators are used to reflect current status and to monitor the effects of reform over time, provide directions for policy development and encourage districts to set and meet their educational standards.

Considerations for Selecting Appropriate Indicators

Education is Iowa's Future: The Strategic Plan for Educational Excellence in the 21st Century identifies the Education System Goal and a series of Support Goals.

> Education System Goal: To improve the level of learning, achievement and performance of all students so they will become successful members of their community and the workforce.
>
> Education Support Goals: State-level leadership and support for Iowa education to create system-wide school improvement and increased student achievement, coordinated support system focused on helping schools and communities meet their local goals, and increased local school capability through training and resources to meet the learning needs of the community.

The State Board of Education and the Iowa Department of Education have developed statewide performance indicators to measure progress toward achieving these goals to improve student achievement and performance.

The following considerations were used to select the statewide indicators for this report. Local school districts may use these as guidelines to report their school district progress within this statewide framework.

- Data Burden - Data that can be collected without additional cost or difficulty to the local school district.
- Proxy Measure - Data currently accessible at the local school district which can be substituted for data that are not currently available (for example, using free and reduced lunch data as a proxy measure for at-risk students).
- Data Trends - Data available across time.
- Reliability - Data collected multiple times with similar or same results.
- Standardization - Data collected in the same method using the same definition.
- Representativeness- Data collected are representative of the population from which they are drawn.
- Data Results - District impact on positive change in the data trend.

Outline

Indicators of Student Success

Indicators of Student Success include the categories of Student Performance, Student Behavior and Success Beyond High School.

Student Performance

- Reading Comprehension Achievement
- Mathematics Achievement
- Advanced Placement Exams
- ACT Composite Scores

Student Behavior

- Grade 7-12 Dropout

Success Beyond High School

- Graduate Follow-up

Student Performance

There are a number of tests which measure student performance. Among them are the Iowa Tests of Basic Skills (ITBS), Iowa Tests of Educational Development (ITED), American College Testing Assessments (ACT), Scholastic Aptitude Test (SAT), Advanced Placement (AP) and National Assessment of Educational Progress (NAEP). These student achievement tests are standardized norm-referenced instruments that measure student learning. The indicators selected for this report utilized results from the ITBS/ITED, Advanced Placement tests and American College Testing Program.

About ninety-five percent of the local school districts voluntarily select to use ITBS (used in grades 4 and 8) and ITED (used in grade 11). The exact percentage can vary depending on the grade level tested and/or the specific school year for which information is reported. The Iowa Testing Program has defined an achievement level reporting system for ITBS and ITED so that school baseline performance can be defined over years. Nationally represented groups that were tested in the spring of 1992 were used to establish the baseline performance. The baseline performance can be used along with long-term goals to help establish annual improvement goals at a local community/district level. This report is provided to each building/district for each of grades 4, 8 and 11 when there are at least ten students per grade level that have completed the test. The two reports are: (1) mathematics based on the ITBS Mathematics Total scores or the ITED Quantitative Thinking scores and (2) reading based on the ITBS Reading Comprehension scores or the ITED Content Area Reading scores. The methodology for these tests includes partitioning of the national percentile rank scale to render achievement levels. Percentile rank groupings 1-40, 41-89 and 90-99 constitute achievement levels and are labeled Low Performance, Intermediate Performance and High Performance.

A set of these three achievement levels is used as an indicator for statewide reporting. Two alternatives have been considered for presentation within the Indicators of Student Success report. One method of presentation combines intermediate and high achievement levels to define successful student performance. The second method shows all three levels. ITBS/ITED scores over two-year periods are combined to make them more stable and overcome inconsistent yearly testing patterns in Iowa schools. The two-year averages help to overcome these inconsistent patterns. The achievement level information presented is based upon an annual participation of 37,000 fourth grade students, 34,000 eighth grade students and 26,000 eleventh grade students and reflects both public and nonpublic school students.

Indicator: Reading Comprehension Achievement

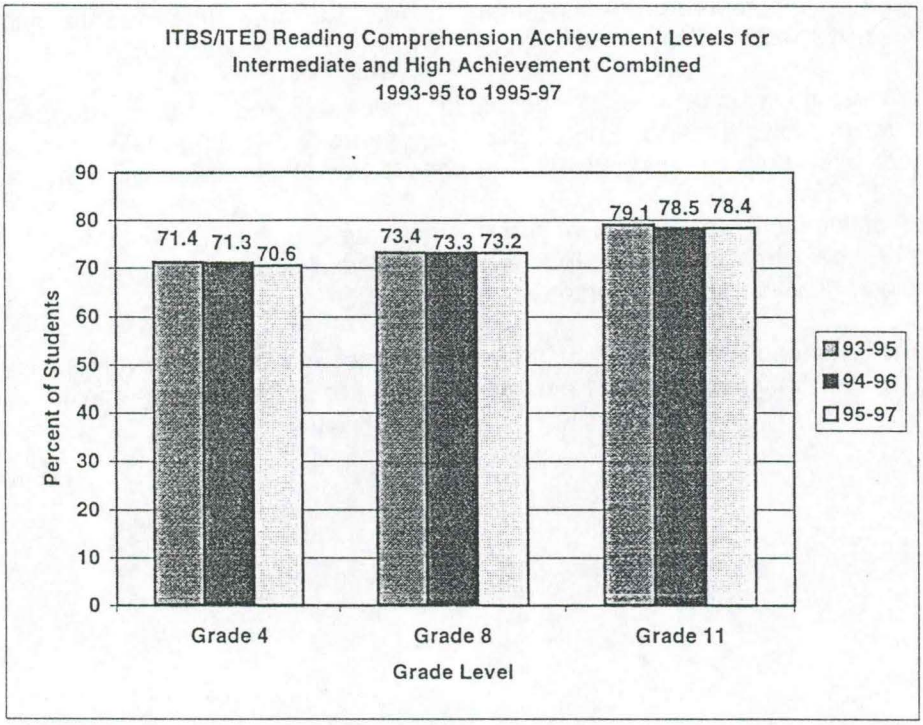
ITBS/ITED Reading Comprehension Achievement Levels for Low, Intermediate and High Achievement, 1993-95 to 1995-97.

Reading comprehension was measured for students in grades 4, 8 and 11, using the Iowa Tests of Basic Skills and the Iowa Tests of Educational Development. Students were grouped into three achievement levels (low, intermediate and high) based upon their performance on the tests.

- The percent of students who scored at the intermediate and high achievement levels in reading comprehension on the ITBS/ITED for three, two-year periods from 1993-95 to 1995-97 has remained relatively stable for grades 4, 8 and 11.

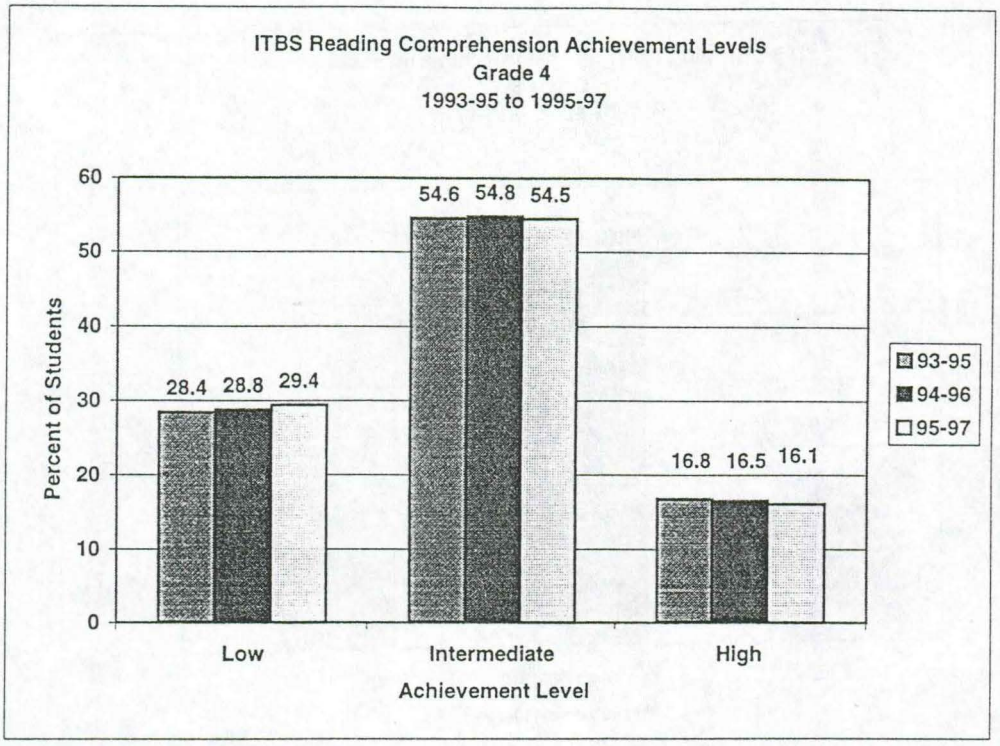
- The percent of students who scored at the intermediate and high achievement levels in reading comprehension ranged from 71 percent in grade 4 to 79 percent in grade 11.

ITBS/ITED Reading Comprehension Achievement



Source: Iowa Testing Programs, University of Iowa

ITBS Reading Comprehension Achievement Levels – Grade 4



Source: Iowa Testing Programs, University of Iowa

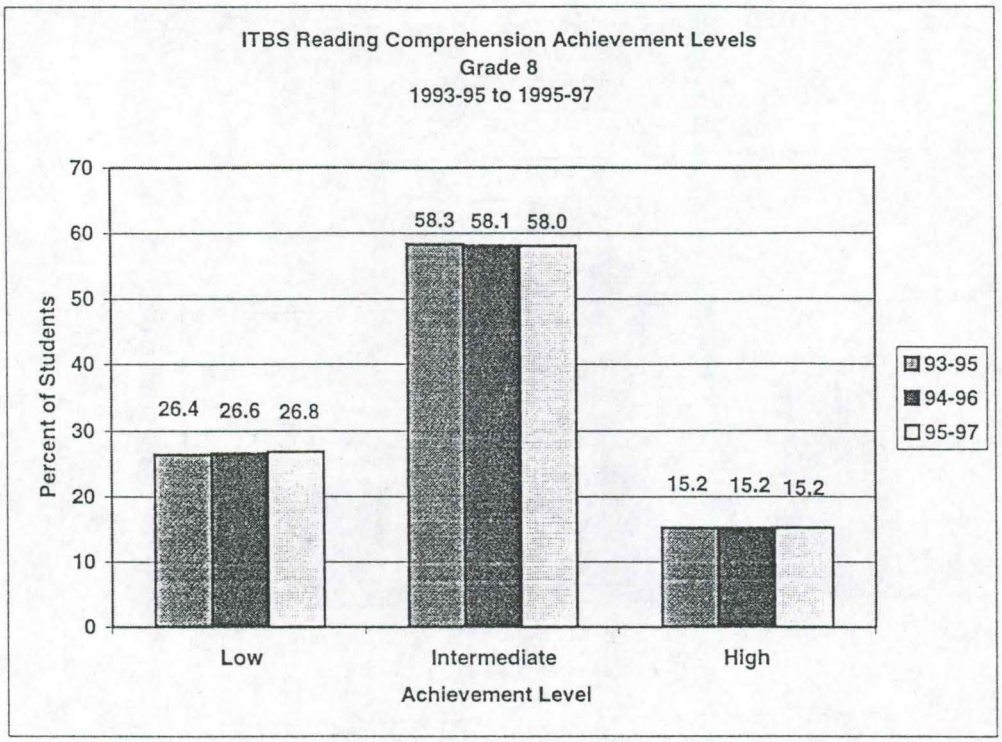
Note: These descriptions indicate how the typical grade 4 student at each achievement level performs with respect to the ITBS Reading Comprehension Test.

ITBS Reading Comprehension: Low Performance Level: Grade 4
Understands little factual information; seldom draws conclusions or makes simple inferences about characters; rarely grasps the main idea, evaluates the style and structure of the test, or interprets nonliteral language.

ITBS Reading Comprehension: Intermediate Performance Level: Grade 4
Understands some factual information; sometimes can draw conclusions and make inferences about the motives and feelings of characters; and is beginning to be able to identify the main idea, evaluate the style and structure of the text, and interpret nonliteral language.

ITBS Reading Comprehension: High Performance Level: Grade 4
Understands factual information; draws conclusions and makes inferences about the motives and feelings of characters; identifies the main idea; evaluates the style and structure of the text; and interprets nonliteral language.

ITBS Reading Comprehension Achievement Levels – Grade 8



Source: Iowa Testing Programs, University of Iowa

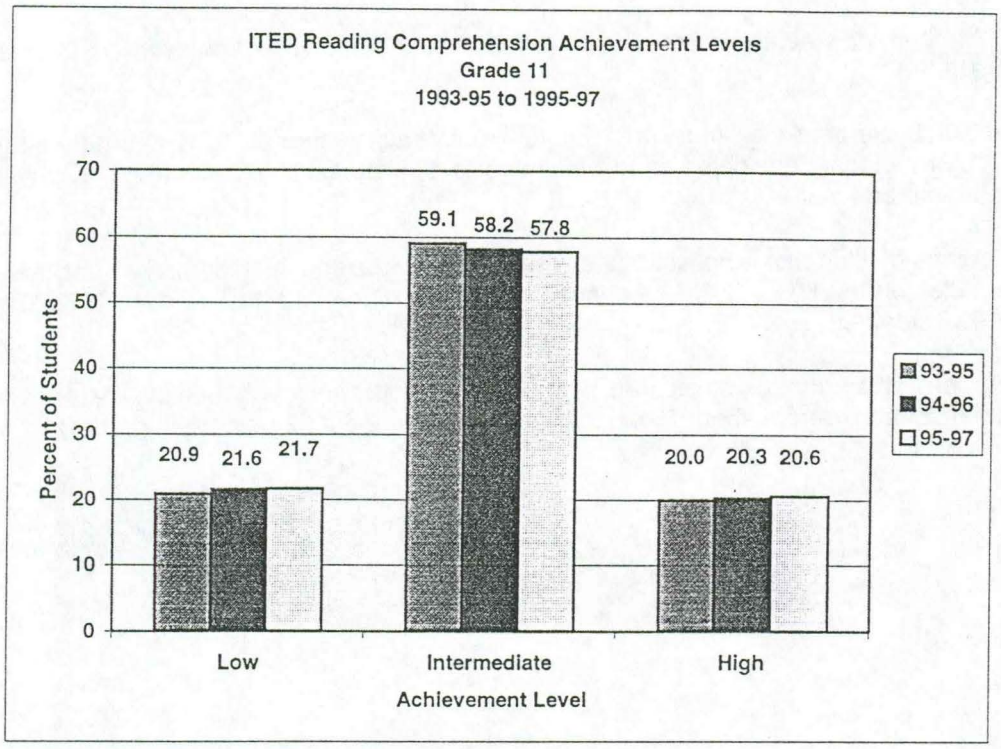
Note: These descriptions indicate how the typical grade 8 student at each achievement level performs with respect to the ITBS Reading Comprehension Test.

ITBS Reading Comprehension: Low Performance Level: Grade 8
Understands little factual information; can seldom draw conclusions or make simple inferences about characters; usually cannot apply what has been read to new situations; can rarely grasp the main idea, evaluate the style and structure of the text and interpret nonliteral language.

Reading Comprehension: Intermediate Performance Level: Grade 8
Understands some factual information; sometimes can draw conclusions, make inferences about the motives and feelings of characters and apply what has been read to new situations; and sometimes can identify the main idea, evaluate the style and structure of the text and interpret nonliteral language.

Reading Comprehension: High Performance Level: Grade 8
Understands factual information; draws conclusions and makes inferences about the motives and feelings of characters; makes applications to new situations; identifies the main idea; evaluates the style and structure of the text; and interprets nonliteral language.

ITED Reading Comprehension Achievement Levels – Grade 11



Source: Iowa Testing Programs, University of Iowa

Note: These descriptions indicate how the typical grade 11 student at each achievement level performs with respect to the ITED Test tasks that determine the Content Area Reading score.

Reading Comprehension: Low Performance Level: Grade 11
Understands little factual information; seldom makes simple inferences; rarely grasps the main idea; and usually cannot identify author viewpoint and style, interpret nonliteral language or judge the validity of conclusions.

Reading Comprehension: Intermediate Performance Level: Grade 11
Understands some factual information; sometimes can make inferences about characters, identify the main idea and identify author viewpoint and style; occasionally can interpret nonliteral language and judge the validity of conclusions.

Reading Comprehension: High Performance Level: Grade 11
Understands factual information; infers the traits and feelings of characters; identifies the main idea; identifies author viewpoint and style; interprets nonliteral language; and judges the validity of conclusions.

Indicator: Mathematics Achievement

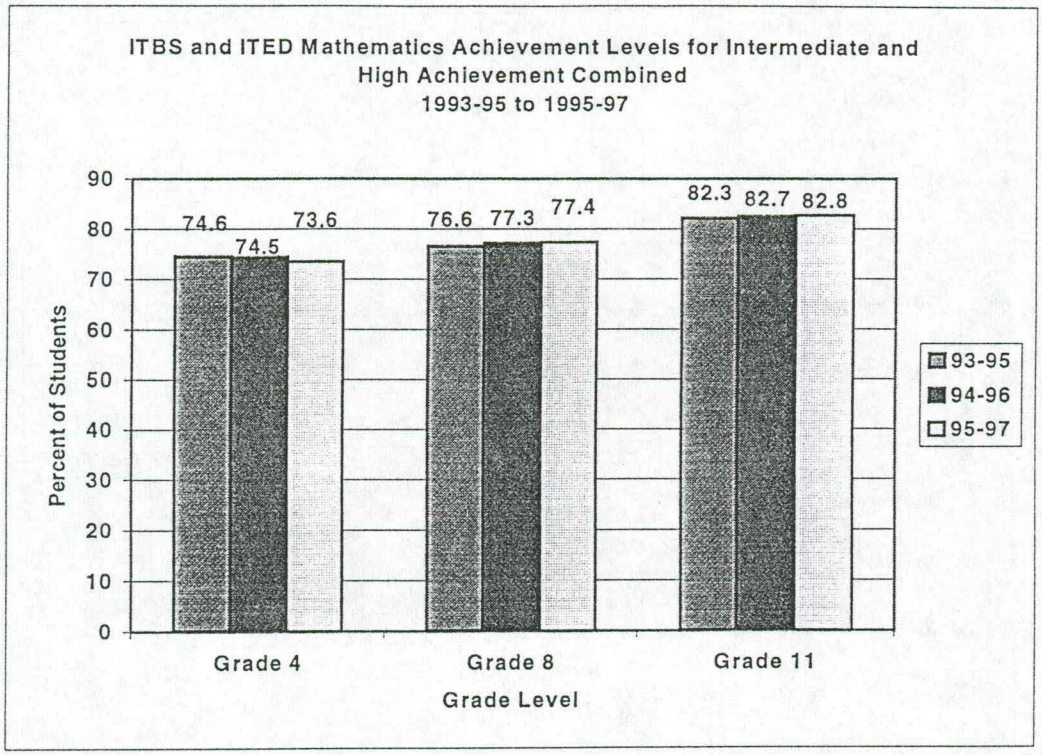
ITBS/ITED Mathematics Achievement Levels for Intermediate and High Achievement Combined, 1993-95 to 1995-97.

Mathematics achievement was measured for Iowa students in grades 4, 8 and 11 using the ITBS/ITED. Groupings were determined according to the student's achievement on the tests (low, intermediate and high).

- The percent of students who scored at the intermediate and high achievement levels in mathematics on the ITBS/ITED has changed little for grades 4, 8 and 11 over 1993-1995 to 1995-1997 time periods.

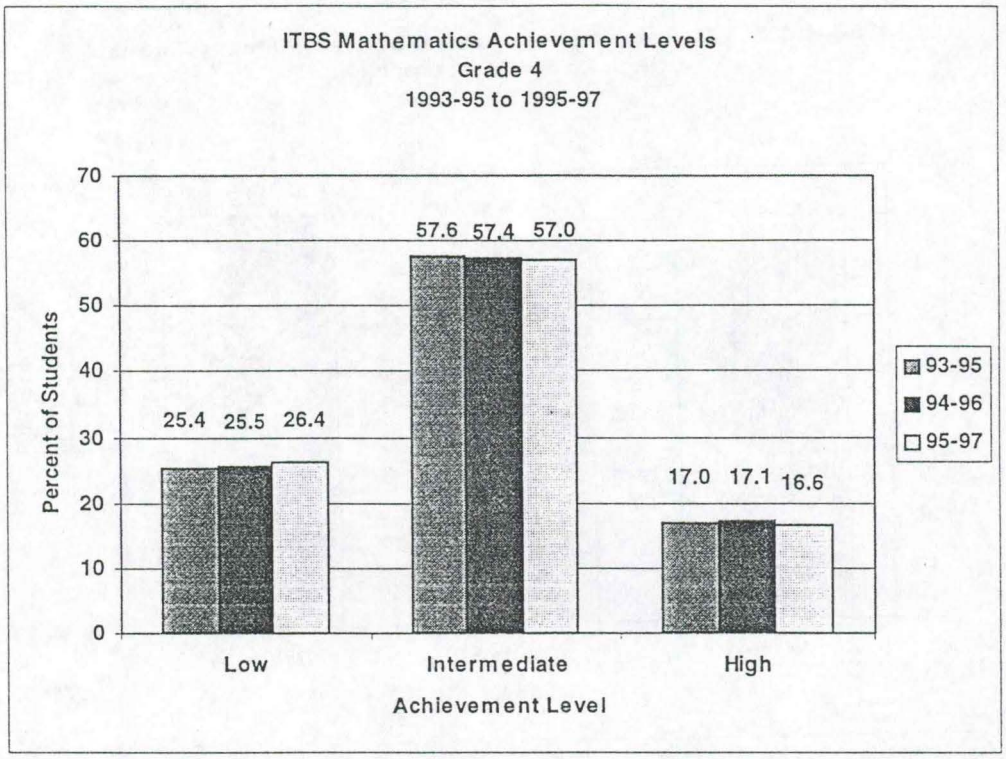
- The percent of students who scored at the intermediate and high achievement levels in mathematics ranged from about 75 percent in grade 4 to about 83 percent in grade 11.

ITBS/ITED Mathematics Achievement



Source: Iowa Testing Programs, University of Iowa

ITBS Mathematics Achievement Levels – Grade 4



Source: Iowa Testing Programs, University of Iowa

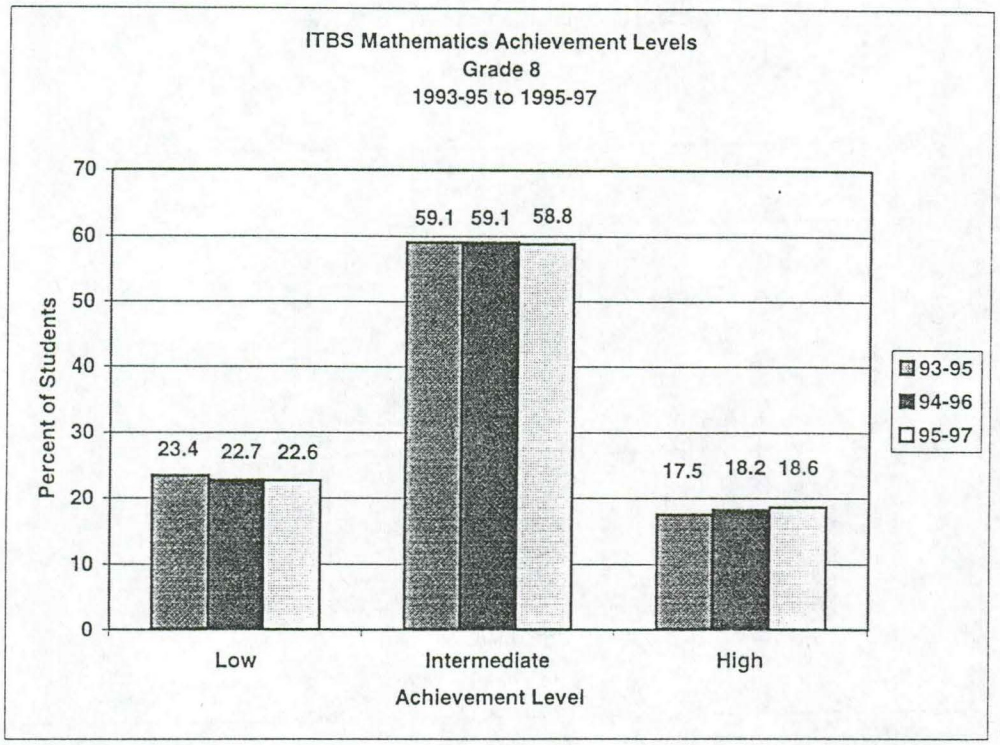
Note: These descriptions indicate how the typical grade 4 student at each achievement level performs with respect to the ITBS Test tasks that determine the Math Total score.

Mathematics Achievement: Low Performance Level: Grade 4
Is beginning to develop an understanding of many math concepts and an ability to solve simple word problems, is generally unable to use estimation methods and is seldom able to interpret data from graphs and tables.

Mathematics Achievement: Intermediate Performance Level: Grade 4
Is developing an understanding of most math concepts, is developing the ability to solve simple and complex word problems and to use estimation methods and is beginning to develop the ability to interpret data from graphics and tables.

Mathematics Achievement: High Performance Level: Grade 4
Understands math concepts, solves complex word problems, uses various estimation methods and is learning to interpret data from graphs and tables.

ITBS Mathematics Achievement Levels – Grade 8



Source: Iowa Testing Programs, University of Iowa

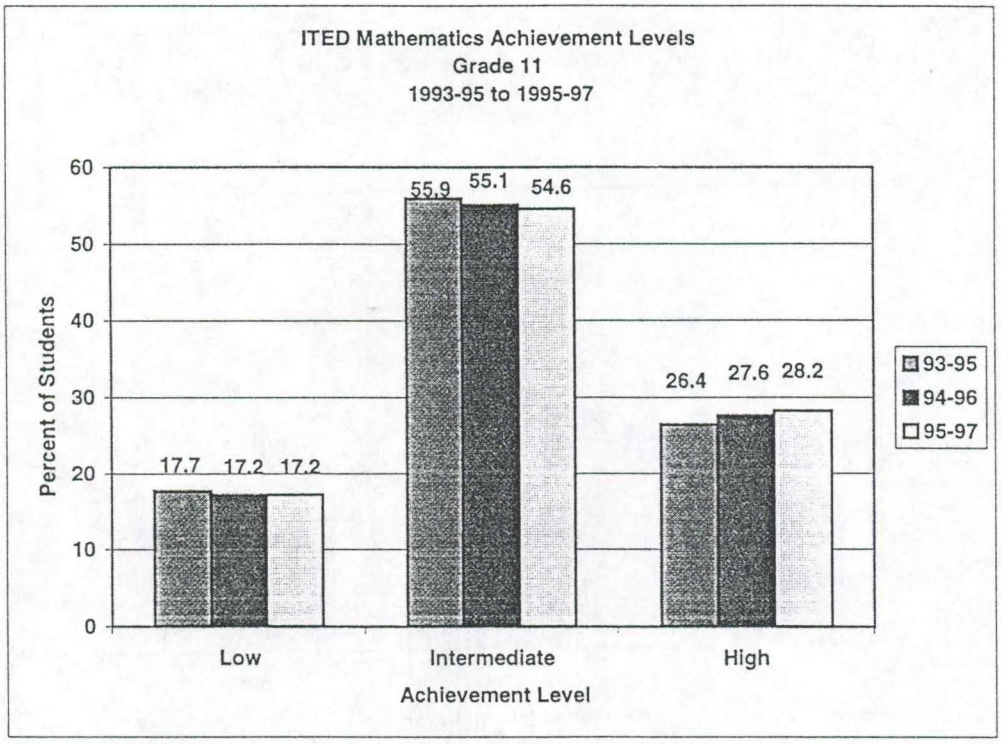
Note: These descriptions indicate how the typical grade 8 student at each achievement level performs with respect to the ITBS Test tasks that determine the Math Total score.

Mathematics Achievement: Low Performance Level: Grade 8
Understands little about math concepts, is unable to solve most simple word problems or use estimation methods and is seldom able to interpret data from graphs and tables.

Mathematics Achievement: Intermediate Performance Level: Grade 8
Is beginning to develop an understanding of most math concepts and to develop the ability to solve word problems, use a variety of estimation methods and interpret data from graphs and tables.

Mathematics Achievement: High Performance Level: Grade 8
Understands math concepts and is developing the ability to solve complex word problems, use a variety of estimation methods and interpret data from graphs and tables.

ITED Mathematics Achievements Level – Grade 11



Source: Iowa Testing Programs, University of Iowa

Note: These descriptions indicate how the typical grade 11 student at each achievement level performs with respect to concepts and problems in the ITED Quantitative Thinking test.

Mathematics Achievement: Low Performance Level: Grade 11
Demonstrates little understanding about how to apply math concepts and procedures, generally cannot make inferences with quantitative information and cannot solve most novel quantitative reasoning problems.

Mathematics: Intermediate Performance Level: Grade 11
Is beginning to develop the ability to apply a variety of math concepts and procedures, makes inferences about quantitative information and solves a variety of novel quantitative reasoning problems.

Mathematics: High Performance Level: Grade 11
Understands how to apply math concepts and procedures, makes inferences with quantitative information and solves a variety of novel quantitative reasoning problems.

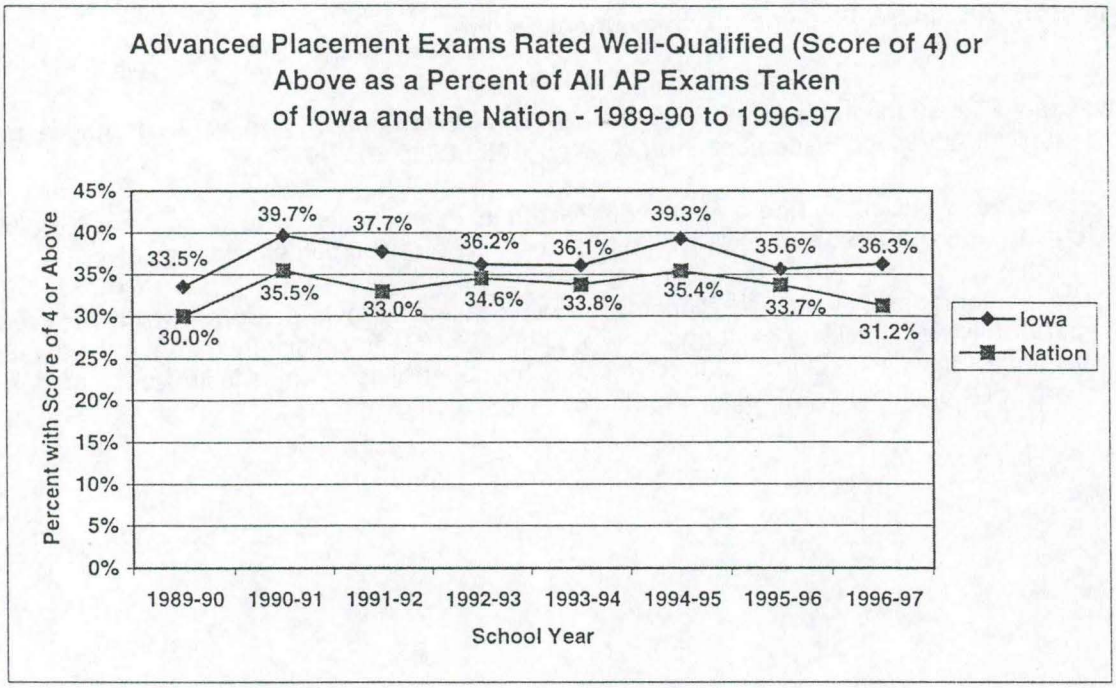
Indicator: Advanced Placement Achievement Exams

Advanced Placement Achievement Exams Rated Well-Qualified (Score of 4) or Above as a Percent of All Advanced Placement Exams Taken, 1989-90 to 1996-97.

- The number of College Board Advanced Placement exams taken by Iowa students increased from 1,536 in 1989-90 to 4,112 in 1996-97, an increase of 168 percent.

- The percentage of Advanced Placement exams taken by Iowa students which received a score of 4 (well-qualified) or above (very well-qualified), was consistently above the level for the nation from 1989-90 to 1996-97. There has been little change in the percentages of scores of 4 or higher on AP exams for Iowa or the nation over time.

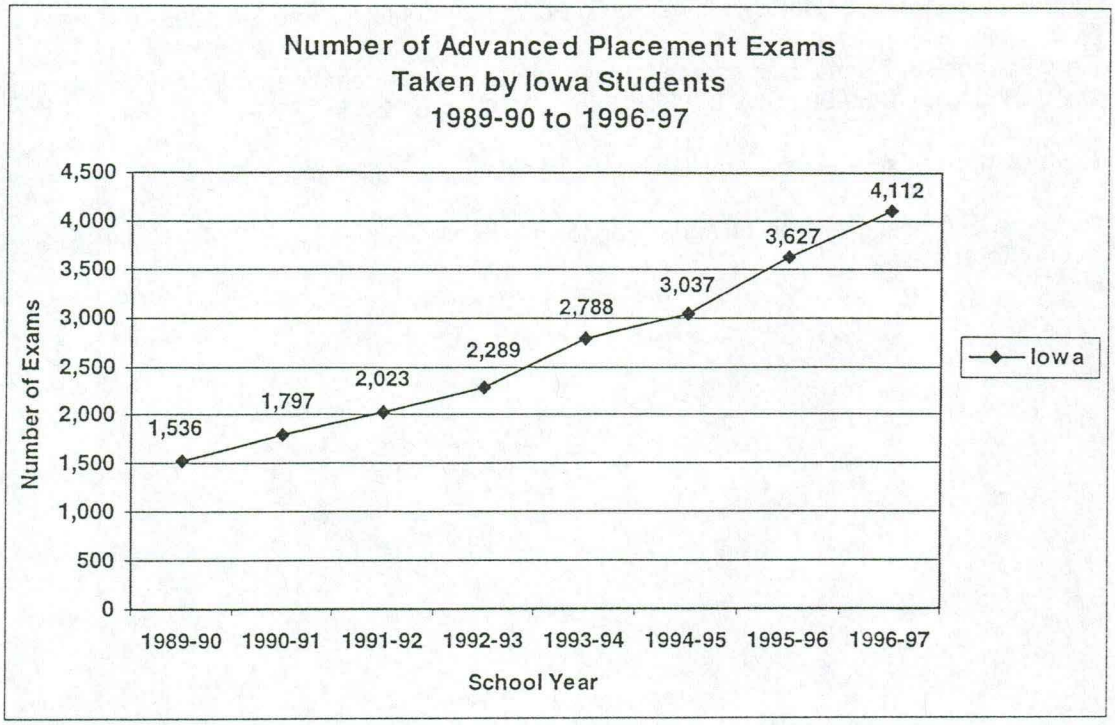
Advanced Placement (AP) Exams of Iowa and the Nation



Source: The College Board, Advanced Placement Program, Iowa Summary Reports, 1989-90 to 1996-97

Note: Advanced placement scores are based on a five point scale; a score of five (5) indicates a student is extremely well qualified; four (4) indicates well qualified; three (3) indicates qualified; two (2) is interpreted as possibly qualified; and one (1) carries no recommendation.

Advanced Placement Exams Taken by Iowa Students



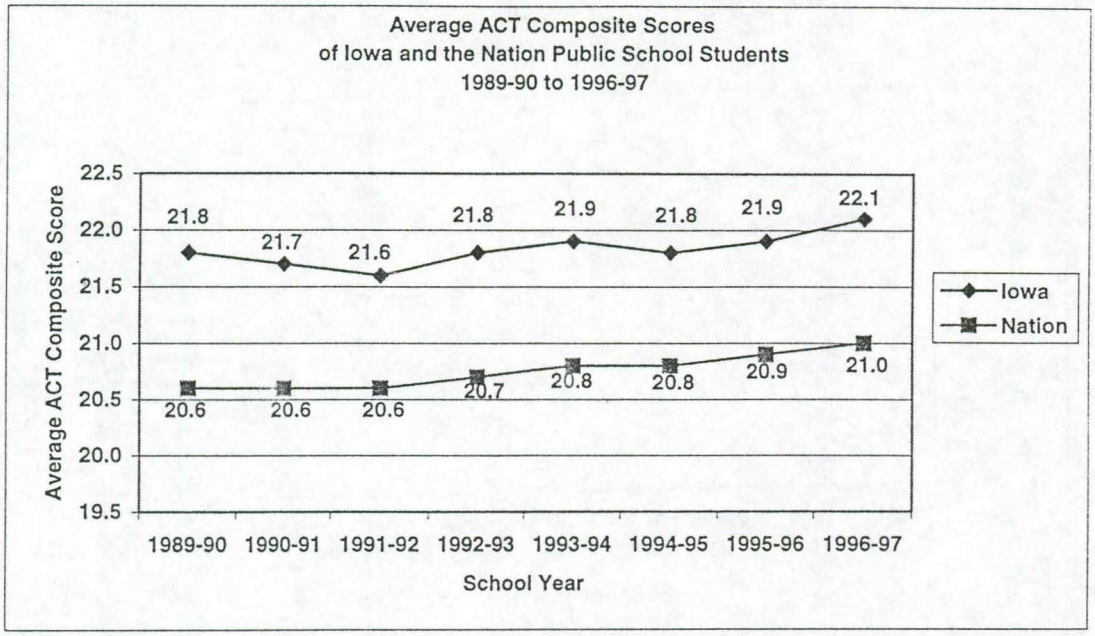
Source: The College Board, Advanced Placement Program, Iowa Summary Reports, 1989-90 to 1996-97

Indicator: ACT Composite Scores

Average ACT Composite Scores of Iowa Public School Students, 1989-90 to 1996-97

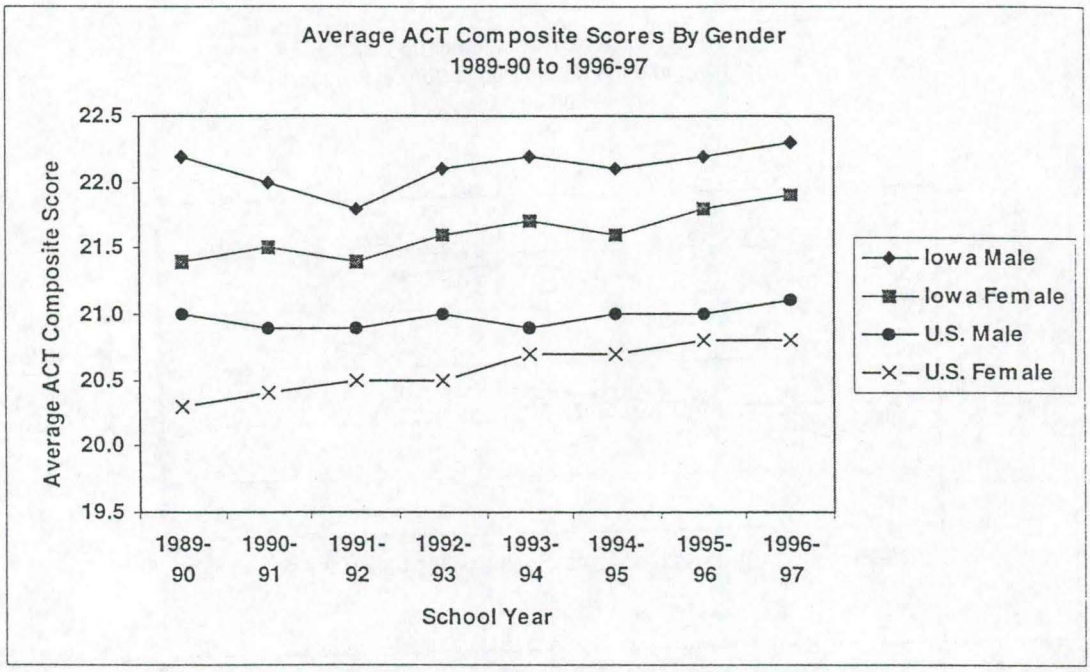
- The average ACT composite scores for Iowa students have remained relatively constant over the period from 1989-90 to 1996-97; 21.6 in 1991-92 and 22.1 in 1996-97.
- Iowa composite scores have consistently been above the national scores.
- Average composite scores of males for Iowa and the nation have consistently exceeded scores for females.

Average ACT Composite Scores of Iowa and the Nation



Source: American College Testing Program, ACT High School Profile Reports for Iowa, 1989-90 to 1996-97

Average ACT Composite Scores by Gender



Source: American College Testing Program, ACT High School. Profile Reports for Iowa, 1989-90 to 1996-97

Student Behavior

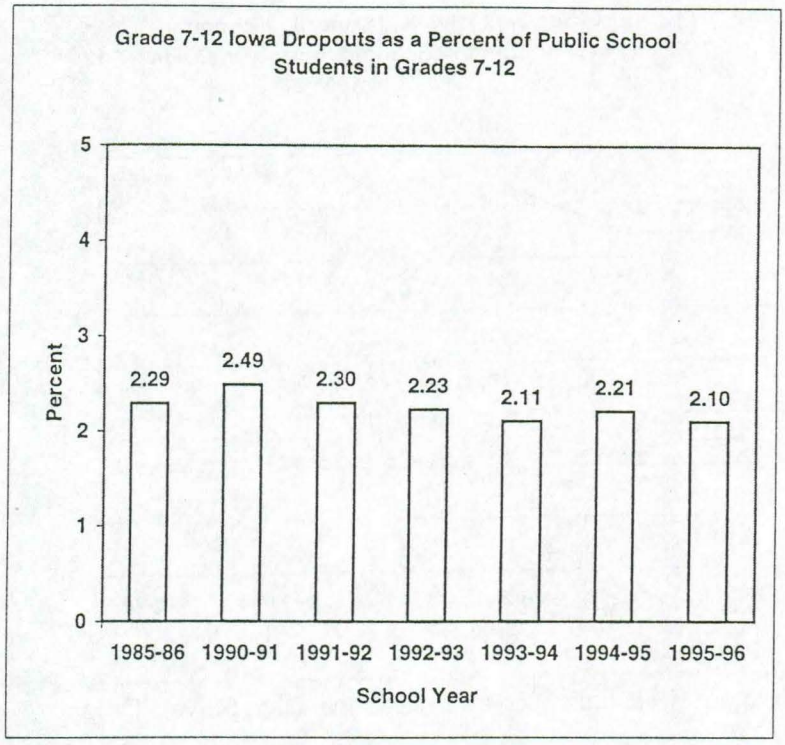
Student behavior is a nationwide educational issue. It is influenced by factors in the home, school and society. Of these, the family structure provides a foundation for positive student growth and development. For these reasons student behavior is an important indicator of student success. One measure of student behavior is the percent of grades 7-12 students who dropout of school.

Indicator: Grade 7-12 Dropouts

Grade 7-12 Iowa Dropouts as a Percent of Public School Students in Grades 7-12, 1985-86 to 1995-96

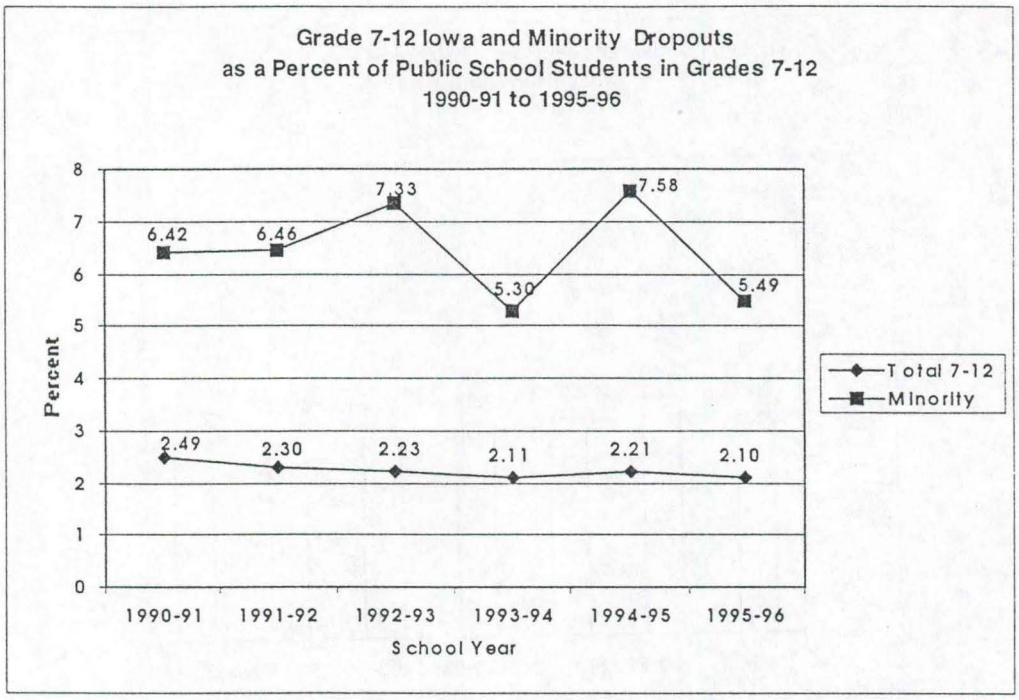
- The dropout rate, based upon grade 7-12 dropouts as a percent of Iowa public school students in grades 7-12, has been consistently low since 1985-86.
- Minority dropouts as a percent of Iowa public school minority students in grades 7-12 has been significantly greater than for all grade 7-12 students; 6.42 percent in 1990-91 and 7.58 in 1994-95.

Grade 7-12 Iowa Dropouts



Source: Iowa Department of Education, Basic Educational Data Survey, Dropout Files

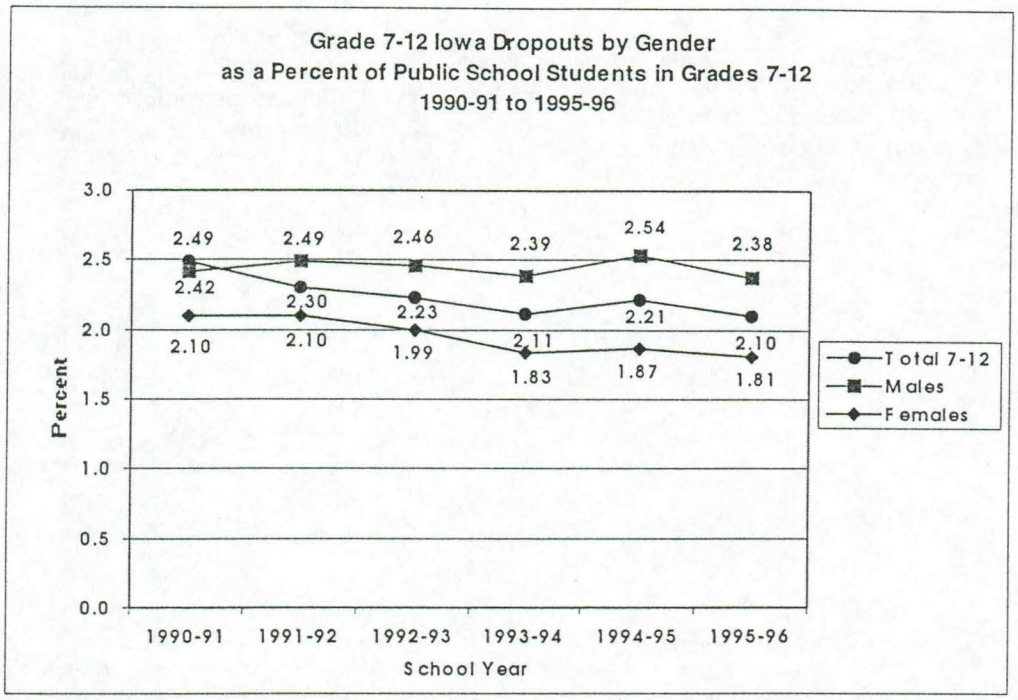
Grade 7-12 Iowa and Minority Dropouts



Source: Iowa Department of Education, Basic Educational Data Survey, Dropout Files

Note: Grades 7-12 Iowa minority dropouts as a percent of minority enrollments in grades 7-12. The minority dropout rate (6.42%) for 1990-91 is an estimate.

Grade 7-12 Iowa Dropouts by Gender



Source: Iowa Department of Education, Basic Educational Data Survey, Dropout Files

Note: Grades 7-12 Iowa dropouts by gender as a percent of enrollments in grades 7-12 by gender.

Success Beyond High School

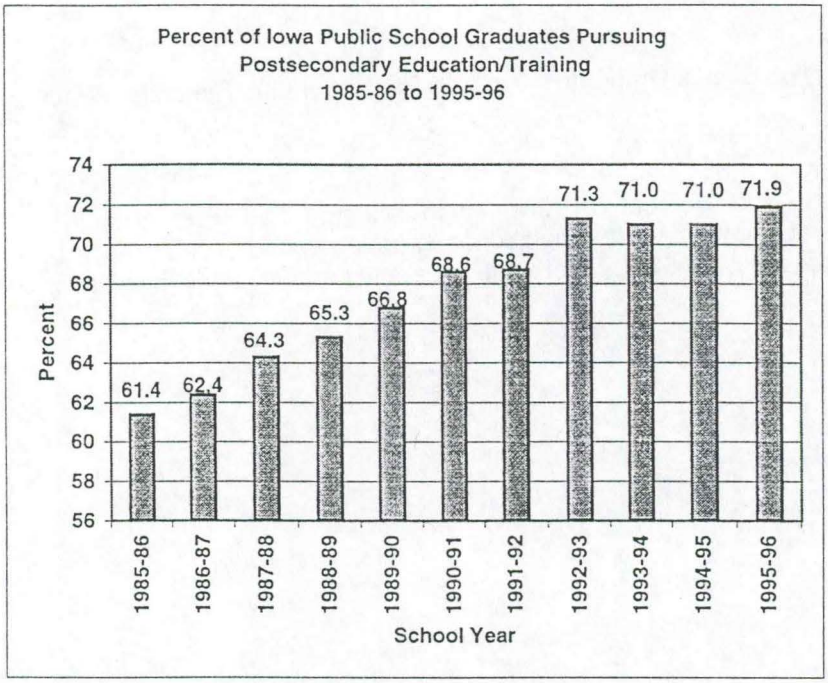
Student success beyond high school is one measure of the quality of the PK-12 instructional program. The educational and employment postsecondary experiences document this success. Graduate follow-up information provides an indication of a student's postsecondary employment and educational pursuits upon leaving the PK-12 system.

Indicator: Graduate Follow-up

Percent of Iowa High School Graduates Pursuing Postsecondary Education/Training, 1985-86 to 1995-96.

- The range in the percent of Iowa high school graduates pursuing postsecondary education/training one year after high school graduation has been from 61.4 percent in 1985-86 to 71.9 percent in 1995-96. There has generally been a steady increase over time.

Iowa Public School Graduates Pursuing Postsecondary Education/Training



Source: Iowa Department of Education, Basic Educational Data Survey, Graduate Follow-up Files, 1985-86 to 1995-96

Future Indicators

Data for the first year indicator report were limited to the areas of student performance, student behavior and success beyond high school. This material focuses on selected indicators allowing for expansion of additional indicators over the next few years.

Areas of expansion include programs, parent/community involvement, transition to employment and staff/teaching support. Proposed statewide indicators for these areas include but are not limited to:

- Percent of students completing a core program of four years of English and three or more years each of mathematics, science and social studies courses
- Percent of students enrolled in math and science (calculus, trigonometry, chemistry, physics)
- Percent of students in postsecondary enrollment options
- ACT average scores of high school students planning to enter the teaching profession
- Percent of students satisfied with local high school
- Grade point average of high school graduates enrolled in postsecondary institutions
- Average units offered and taught
- Percent of districts with all-day everyday kindergarten
- Pupil teacher ratio
- Percent of full-time teachers with advanced degrees
- Average district experience for teachers
- Average total experience for teachers

Glossary

ACT: American College Testing Program, Iowa City, IA
The ACT Assessment or A-C-T as it is called, is a national college admission examination that consists of tests in English, Mathematics, Reading and Science Reasoning. This test is a measure of an individual student's potential for success in college.

Advance Placement: The AP program is a cooperative educational endeavor between secondary schools, colleges and universities. It exposes high school students to college-level material through involvement in an AP course, and gives them the opportunity to show that they have mastered it by taking an AP exam. This means a high school student can gain formal college course credits or college placement.

Core Program: A core program as defined by ACT is a typical college preparatory program including English (four years or more), mathematics (three years or more), social studies (three years or more) and natural sciences (three years or more).

Dropout: A dropout is a student in any of grades seven through twelve not enrolled in an educational program provided by a public school district and who has not graduated from high school or has not completed a district or state approved educational program.

Educational Indicators: An indicator is one form of a measure of the success or lack thereof of a school program or curriculum experience. An educational indicator system can provide descriptive information about student performance and the status of education.

ITBS/ITED: Iowa Tests of Basic Skills/Iowa Tests of Educational Development
ITBS/ITED are standardized achievement tests. ITBS provides a comprehensive measurement of growth in the fundamental skills: listening, word analysis, vocabulary, reading, writing, and methods of study and mathematics. ITED includes correctness and appropriateness of expression, ability to do quantitative thinking, social studies, natural sciences, literary materials, vocabulary, sources of information, total, and reading total.

Example:
Grade 4: Reading Comprehension: High Performance Level
Understands factual information; draws conclusions and makes inferences about the motives and feelings of characters; identifies the main idea; evaluates the style and structure of the text; and interprets nonliteral language.

Grade 4: Reading Comprehension: Intermediate Performance Level
Understands some factual information; sometimes can draw conclusions and make inferences about the motives and feelings of characters; and is beginning to be able to identify the main idea, evaluate the style and structure of the text, and interpret nonliteral language.

Grade 11: Mathematics: High Performance Level
Understands how to apply math concepts and procedures, makes inferences with quantitative information and solves a variety of novel quantitative reasoning problems.

Grade 11: Mathematics: Intermediate Performance Level
Is beginning to develop the ability to apply a variety of math concepts and procedures, makes inferences about quantitative information, and solves a variety of novel quantitative reasoning problems.

Code of Iowa
Chapter 280.12 Goals and plans—evaluation—advisory committee.
Chapter 280.18 Student achievement goals.
The section of the code requires the school districts to engage in long-range planning processes that result in the establishment of specific district goals with regard to student performance and to report the degree of success in meeting those goals.

House File 2272
This bill requires the State Board of Education to adopt rules relating to the incorporation of accountability for student achievement into the education standards and accreditation process.

Appendix

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EDUCATION INDICATORS

In a major newspaper, one state's superintendent based claims that the schools were performing well on statewide assessment results. In a subsequent article, the paper cited a major research analyst who acknowledged that the results suggested the potential effectiveness of the state's educational reforms, but at the same time, cautioned that some of the improvement in scores may have come because less able students dropped out and that the score gaps between minorities' and Anglos indicated that the

strongest gains were made by those groups who have always done well. Later, the same newspaper advocated the reelection of the superintendent with the ringing endorsement that "He raised test scores."

At the national level, President Bush and the governors issued education goals in 1989. These goals were motivated in part by concerns about the U.S. position in an emerging global economy in light of repeated evidence of poor performance of U.S. students in cross-national achievement comparisons.

These illustrations capture the increased visibility, multifaceted roles, stakes, and dynamics that data play in public policy deliberations about educational quality and improvement. They also clarify heightened national and state interest in developing education indicator systems. As educational policymakers confront such compelling statistics on dropouts, student achievement, and educational quality and equity every day, they often make decisions based on them. According to Oakes (1986, p. v), both the confrontation and the decisions generate a host of new concerns, such as:

- How should these numbers be interpreted—for example, how are dropout rates being calculated?
- What information from national statistics can be applied to our state or local district?
- What data are available for judging the quality of our educational system? If data do not exist, do we know how to obtain them?
- Can statistics be used to determine whether a policy is having its intended effect?
- What data about our schools should we collect on an ongoing basis?

In light of current interest and continuing concerns about education indicators, this article presents a synthesis of their whats, whys, and hows as seen from the perspective of the 1980s—with signs of even greater interest in the 1990s.

What Are Indicators?

Although definitions of education indicators vary, here they are considered to be policy-relevant statistics designed to provide information about the status, quality, or performance of the educational system (for related definitions, see Kaagan & Smith, 1984; Oakes, 1986; Shavelson, McDonnell, & Oakes, 1989). Either single or composite statistics can meet this initial condition. But, for a statistic to qualify as an indicator, it must have a standard against which it can be judged (e.g., with itself over time or with itself measured in different places or systems). Moreover, indicators must meet certain substantive and technical standards that define the kind of information they should provide and the features they should measure.

To have meaningful policy implications, an indicator is placed in a particular context. That is, within a mature set of indicators, each bears an understandable relation ship to the health of the system and to each other so tha together they can be viewed as a model of the syste (Kaagan & Smith, 1984; Shavelson, McDonnell, & Oake 1989). No matter how valid and reliable any single indic tor may be, its interpretation is extended by indicators tha reflect the larger educational system. An obvious exampl is student achievement trends: Changes in studen achievement scores may be misinterpreted unless ther is other information, such as whether student character istics, the curriculum, student attendance, or dropou rates have changed. Consequently, *indicator systems* ar developed, which (ideally) measure distinct component of the system of interest but also provide informatio about how the individual components work togethe to produce the overall effect (Oakes, 1986).

Indicator development is usually driven and sus tained by political interests, such as expectations that in dicators can result in accurate information about the con dition of education and that this information can be ar integral part of the process of educational improvement. Moreover, indicators and indicator systems themselve are political entities. Their construction reflects partic ular assumptions about the nature and purposes of education, and they often embody beliefs about what direc tions reform should take. The indicators that are selected will push the education system toward the assumptions and beliefs they embody—that is, what is measured is likely to become what matters. Even such technical matters as sampling strategies, levels of data disaggregation, and reporting strategies carry with them political perspectives about how the education system can be understood and improved.

Indicator design and development, then, involve a dynamic interplay of both technical and policy concerns. Critical criteria for judging the value of indicators and an indicator system in such an environment are importance, validity, and feasibility. These criteria are interwoven to yield judgments of the usefulness and credibility of the information system intended to aid the functions of monitoring and improving education.

Finally, education indicators may be considered social indicators applied to education (Jaeger, 1978). This framing connects efforts to develop education indicators historically to more general developments in the social indicator movement (Bauer, 1966; de Neufville, 1975; MacRae, 1985; Rockwell, 1989) and to associated discussions about economic and health indicators.

Indicator History

Most historical accounts attribute social indicator development to political responses at a time of questioning of national status and values. For instance, after the Soviet Union's success with Sputnik and the resultant concern with science and education, President Eisenhower

established a commission to study national goals and to specify general guidelines for policy and program coordination. According to de Neufville (1975), this effort represented "a general groping for a handle on problems still only vaguely perceived, at a time of questioning of basic values" (p. 43).

Economic indicators further spurred the social indicator movement. Economic indicators, successful in the mid-1960s when economist-recommended tax cuts effectively stimulated the economy, prompted a call for similar indicators that could monitor and predict the effects of social policy. At the same time, critics of the narrow monetary focus of economic indicators supported the search for broader measures of social conditions. The extensive development of social programs during the 1960s and society's heightened self-consciousness about social actions further stimulated interest in social indicators as mechanisms that could evaluate programs and justify expenditures (Bauer, 1966). Congress considered an annual social report and creation of a Council of Social Advisors. Scholarly legitimation of social indicator developments, exemplified by important reports from the Russell Sage Foundation (Campbell & Converse, 1972; Sheldon & Moore, 1968) and articles in professional journals, gave the movement exposure.

The momentum sustaining these efforts was short-lived. With the change of administrations in 1969, the federal government began to back away from its commitment to social reporting (Rockwell, 1989). This retreat and the diminished financial support for social indicators has been attributed to disillusionment resulting from naive expectations and unfulfilled promises and to an overemphasis on the concerns of social science research rather than the needs of the policy community.

Education indicators, although connected to broader social indicator developments, also possess a unique history—beginning in 1867 when the U.S. Department of Education was established precisely to collect and report education statistics (although the department was reduced in status and placed under the Bureau of the Interior only a year later). Currently, the National Center for Educational Statistics (NCES) in the U.S. Department of Education annually publishes *The Digest of Educational Statistics* (a compendium of statistics about education) and *The Condition of Education* (a collection of charts and graphs based on these statistics and augmented with some discussion of their meaning). Some statistics are broken down by regions of the country and sectors of the population, and some trends are reported. Studies sponsored by the U.S. Department of Education and the National Science Foundation (NSF) (e.g., the National Assessment of Educational Progress [NAEP], the High School and Beyond Study [HS&B], the 1985 National Survey of Science and Mathematics Education [NSSME], and the National Educational Longitudinal Study of 1988 [NELS-88]) gather and report either cross-sectional or longitudinal information about student achievement and educational conditions in a representative sample of schools. These data are used to draw conclusions about schooling nationally.

In addition to these federal efforts, most states have collected a great deal of information about school finance, enrollment, and achievement. However, historically, none of these national or state efforts has been designed to feed information regularly into a national indicator system or to provide comparable state-by-state data.

As with the more comprehensive social indicators movement, the current interest in education indicators was triggered by general concerns about the quality of education and the need for reform. In 1983, *A Nation at Risk* (National Commission on Excellence in Education [NCEE]) used national and international test score data (e.g., scores from the NAEP, the Scholastic Aptitude Test [SAT], and international achievement surveys) to warn of declines in the quality of American elementary and secondary schooling. Other *excellence* reports (e.g., The National Science Board's [NSB's] report, *Educating Americans for the 21st Century* and those of The Education Commission of the States Task Force on Education for Economic Growth and the Twentieth Century Fund's Task Force on Federal Elementary and Secondary Education Policy) echoed the NCEE's concern that the educational attainments of all students would be an increasingly critical factor in the nation's scientific and technological competitiveness and national security.

In addition to their calls for improvement, some reports recommended that reform efforts be closely monitored. The NSB's report, for example, strongly recommended that the NSF embark on an effort to collect statistics on students' participation and achievement, in order to monitor progress toward the goal of the highest quality education and highest participation level in the world by 1995. To fully understand the potency of the *monitoring* charge, however, requires consideration of the changed political priorities in the 1980s. After Ronald Reagan's election, federal education policy increasingly shifted the responsibility for the control and financing of educational programs and reform efforts to states and local school districts. By highlighting the national need to gather and report data about the quality of education and the progress of reforms, the federal government maintained a visible role in responding to the educational crisis that was both central and consistent with administration philosophy.

Moreover, in an era dubbed *the information age*, a demand for more and better data about the condition of schooling accompanied the call for educational reform. Recent advances in information technology made possible the amassing and analysis of information with a quality and speed never imagined by reformers several decades ago. Developing the capacity to document sys-

tematically the quality of schools with indicators could be viewed, then, as a means of providing a public record of the status of education, a mechanism for monitoring reform efforts, a way to hold schools accountable for *quality* (however it was defined), and as an integral part of the improvement process itself.

As a result of this interest in monitoring, available education data have increasingly been represented as indicators. Most widely known and publicized is the Secretary of Education's annual *Wall Chart*. The chart consists of a small number of statistics drawn from federal data collection efforts or aggregated from state data. States are compared on student performance (as measured by SAT and American College Test [ACT] scores), per pupil spending, average class size, average teacher salaries, and dropout rates. Additionally, since the mid-1980s, the U.S. Department of Education has presented its *Condition of Education* statistics as indicators, and the NSF has included a chapter reporting statistics on precollege science and mathematics education in its biannual publication, *Science Indicators*. None of these publications, however, attempts to present a related system of education indicators.

A flurry of new indicator development activity has been triggered as well. The key events that characterize these efforts are chronicled in Table 1. This chronology illustrates both the growing momentum of indicator interest and its extension into activities of the governors and the Council of Chief State School Officers (CCSSO), Congress, and international organizations such as the Organization for Economic Cooperation and Development (OECD).

Most recent efforts attempt to provide more indicators, to develop indicator systems, and to remedy the inadequacies in existing data. For example, much of the CCSSO's activity came in response to the considerable controversy that the Wall Chart created. Many critics objected to comparing the quality of states' educational systems with a small number of measures that do not account for the tremendous differences among states in conditions that enhance or constrain their educational efforts. Others took exception to the use of measures that were neither defined nor measured consistently across states (e.g., dropout rates) and to measures not equally relevant for all states (e.g., using ACT and SAT scores to compare student achievement). Increasingly,

TABLE 1. *Indicator activity in the 1980s*

Date	*Activity*	*Significance*
1983	*A Nation at Risk*, and other excellence reports	Triggers concern about education's quality and calls for monitoring
1984	The first Wall Chart	Triggers concern about quality of available data and its use in state comparisons
1984	CCSSO Resolution	Signals states' willingness to assist in developing comparative data and creates State Educational Assessment Center
1985	National Research Council's report on Education Indicators (Raizen and Jones)	First research-based indicator report
1985	National Research Council's report on the National Center for Educational Statistics	Recommends support for reorganizing federal effort to collect and report education data and strengthening the agency responsible for data collection
1986	Alexander–James Report	Recommends revision of NAEP to permit state comparisons
1987	*The Underachieving Curriculum* (McKnight)	International math comparisons fuel concerns about student performance and U.S. and international standards
1987	OECD Indicators project launched	Signals cross-national interest in indicator development and comparative data
1988	Hawkins–Stafford Act	Congressional support for national indicator development; national and state cooperation in data collection; expansion of NAEP to include state-by-state data
1989	National Forum on Education Statistics	Collaborative effort by states and U.S. Department of Education to recommend improvements in national statistics
1989	Formation of congressionally mandated study of educational indicators	National panel of technical experts and policymakers to report on the quality of policy-relevant education data and recommend improvements in the stock of education indicators produced by NCES
1989	Charlottesville Education Summit	Joint effort by President Bush and state governors to set National Education Goals
1990	President Bush's State of the Union Address	Emphasizes national goals and need to monitor progress toward them

however, the CCSSO has cooperated with NCES's efforts to improve the national data system.

Uses of Indicators

Defined jointly by the specified purposes and intended audiences of the indicator system, the appropriate use of particular indicators may be explicitly attended to or merely assumed by indicator developers and sponsors. For instance, in the 1960s, policymakers' needs and the issue of how indicators might be useful were ignored, because social scientists naively held to the empiricist belief that data would inevitably aid problem solving (de Neufville, 1975). Today, informed by the difficulties and failures of earlier efforts with social indicators, developers of education indicators claim more realistic uses for indicators and incorporate policymakers' concerns in the development process (Shavelson, McDonnell, Oakes, & Carey, 1987).

In addition to a more explicit focus on use, current efforts address the needs of multiple constituencies. Recent reforms have been shaped as much by governors, state legislators, the business community, and the public as they have been influenced by educators and the CCSSO. This expanded constituency marks a change in the educational decision-making process and represents an expanded audience for indicator data (Hall, Jaeger, Kearney, & Wiley, 1985).

Considering the purposes motivating indicator development, several claims for indicator systems appear achievable and point to justifiable uses of indicators. First, an education indicator system can provide descriptive information about the status and performance of education. This information supports the monitoring function by informing both policymakers and the public about conditions—and as trends are monitored over time, about changes in conditions. Tracking conditions for different subgroups (e.g., ethnic minorities or geographic regions) permits additional information about variability in these conditions to be obtained. Purely descriptive, this form of monitoring serves to inform the dialogue between citizens, policymakers, and educators.

A second factor motivating education indicator development has been the desire to monitor the effects of reforms and provide directions for policy. This purpose often extends beyond description into a policy analytic, explanatory function. However, indicator systems are not sophisticated enough to imply causality, because in natural settings many factors can lead to observed conditions, or even trends in these conditions (Oakes, 1986). More aptly, indicators can suggest "hypotheses for exploring, evaluating, and perhaps initiating new policies and programs, or in modifying existing ones" (Shavelson, McDonnell, Oakes, & Carey, 1987, p. 41). When relationships are well established (e.g., course taking and achievement), trend data can warn of potential problems that may be dealt with more effectively. Such information can help improve policy.

Accountability—holding schools accountable for quality—represents a third purpose of indicator system development that is unique to education. For example, Murnane (1987) claims that educators are considered responsible for students' failure to learn in a way that employers would never be held responsible for the unemployment rate. In a general way, this function results from the public nature of indicators and the corresponding pressure on educators to improve the quality of education. However, some indicator systems, especially state-level systems, are designed specifically to hold local districts and schools accountable. In these instances, incentives or sanctions often are linked to performance. In either case, the accountability function can be problematic (for example, when it fosters narrow goals or leads to corruption of the measures). Although these difficulties are more likely to be encountered when a system is linked to sanctions and rewards, general pressure created by indicator systems also can negatively influence education. For these reasons, a cautious approach supports a system in which indicators inform rather than drive the process.

Selection and Construction of Indicator Systems

Because indicators may be considered to be data organized and reported to inform public judgments and policy actions, the construction process itself contains both political and technical aspects. The question of indicator quality then entails a double judgment about the quality of the data itself (in a traditional reliability and validity sense) and the quality of its translation into an indicator (which adds concerns of feasibility, utility, and credibility).

Three bodies of research inform the indicator construction process. First is the methodological literature on the construction of social indicators, which leans heavily toward conceptual rather than empirical development (de Neufville, 1985; Johnstone, 1981; MacRae, 1985). With the policy orientation of indicator use, another source of methodological ideas about design and development is found in the extensive validity literature in evaluation research and program evaluation (e.g., Burstein, Freeman & Rossi, 1985; Cronbach, 1982; Cronbach et al., 1980). In addition, more specific technical aspects of indicator development rely on the construct validity research to derive *touchstones* for the process (Campbell & Riske, 1959; Cronbach, 1971). Based on a synthesis of information from these sources, Table 2 describes six distinct stages in the indicator creation process and the political and technical concerns that characterize each stage.

Conceptualization and Selection of Indicators. The first important task in developing educational indicator systems involves identifying those dimensions of the ed-

TABLE 2. *Stages in constructing indicator systems*

Stage	*Technical description*	*Political issues*
Conceptualization and selection	Concepts and qualities are specified and organized into a framework that models relationships among concepts.	Political values and purposes exert a strong influence.
Component measures	Operational components are defined and assessment strategies determined. Concern is with data sources, collection methods, and a strong link between measures and the concepts of interest. Reliability and validity issues dominate.	Concerns reflect issues with agreement on definitions, credibility, cost, and political support.
Data collection	Data gathering procedures are developed. Quality control in administration is set. Sampling versus census is decided to adequately represent unit of interest.	Respondent burden and cost issues are primary. Sample inclusion–exclusion criteria also are important.
Construction and scaling	Component measures are combined to create indices that portray target qualities. Strategies for aggregating and weighting data are developed.	Alternative scaling, aggregating, and weighting schemes reflect values and needs.
Contextualization	Indicators are analyzed and presented in relation to interacting contextual factors.	Decisions about what background, student, and school factors matter. Comparisons are made fair.
Communication	Indicators are summarized and reported accurately to interested parties.	Timing, presentation format, and inclusion of interpretive information influence message and audiences.

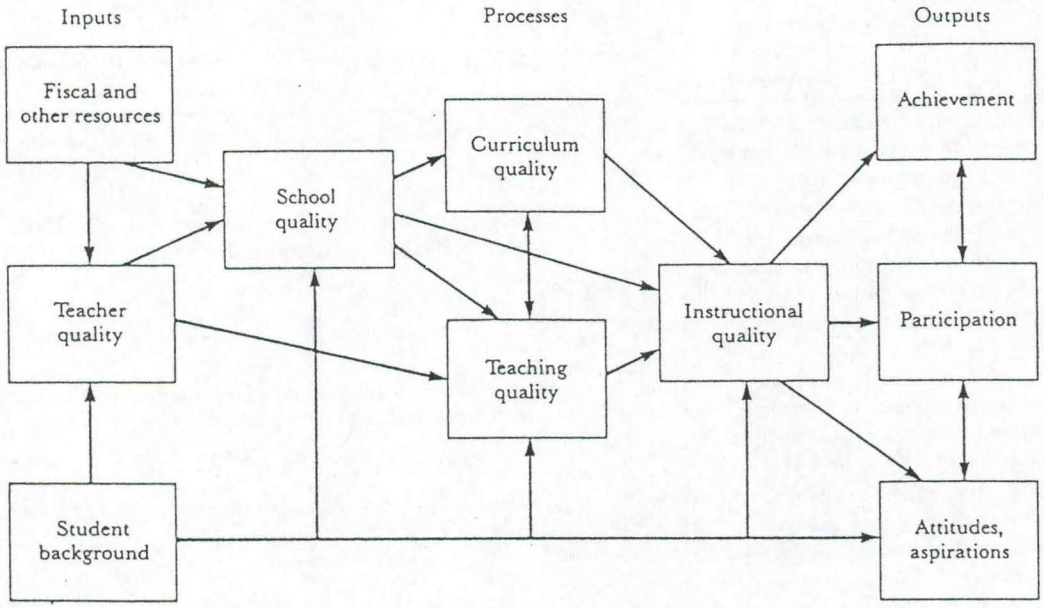
ucational system about which indicators are needed. On the technical side, both the U.S. Department of Education (through NCES and the National Research Centers) and NSF (through its sponsorship of projects at such research centers as the National Academy of Science and the Rand Corporation) have attempted to develop technically sound, research-based conceptions of indicator systems and specifications of the individual indicators that should compose them. On the political side, such organizations as the CCSSO (through its State Education Assessment Center) and the NCES have marshalled efforts to develop a consensus about what indicator data would be the most useful and feasible to produce.

Nearly all research-based indicator projects begin with the investigator explicitly specifying a conceptual model of how the education system works (Hall, Jaeger, Kerney, & Wiley, 1985; Raizen & Jones, 1985). Even politically driven indicator-selection processes carry with them implicit models (de Neufville, 1975). For example, Rand's indicator work began from a model (Figure 1) that includes resources available to the system (fiscal and human resources, e.g., quality of the teachers and the educationally relevant background characteristics of students); processes by which schools use their resources to affect student participation and learning (e.g., curriculum, teaching, and other instructional activities); and student participation and learning themselves. Based on this model, Rand used research on schooling to identify specific indicators to fill out the model (Shavelson, McDonnell, Oakes, & Carey, 1987; Shavelson, McDonnell, & Oakes, 1989).

Models ensure that the indicators selected are comprehensive enough to adequately describe the important dimensions of the education system, explore relationships among elements, and address unanticipated policy issues. (One caution, however, is that the information generated from model-based indicator systems is often susceptible to unwarranted causal interpretations.) Another advantage of grounding indicator selection in a model is that it enables a careful assessment of what is likely to be lost when the comprehensiveness of a monitoring system must be limited because of measurement limitations, costs, and the burden that data collection places on schools and students.

The ability to select genuinely useful indicator systems depends on more than sound models and technical criteria. Indicators are not likely to be either useful or used unless they reflect what policymakers and practitioners view as important. For that reason, some indicator selection processes have focused heavily on developing a political consensus about which features of schooling should qualify as indicators. For example, the CCSSO has undertaken such activities with the support of NSF and NCES. Blank and Espenshade (1988) attempted, through repeated surveys of state education agencies, to determine which indicators (about matters such as resources, curriculum, teaching, and learning in mathematics and science) now are included in states' own information systems and what new indicators both would be useful and feasible for states to collect. The project's goal was to expand the number of comparable state indicators by developing a consensus among the

FIGURE 1. *Rand model of the education system*



states about that information that they deem most important. A second CCSSO project is the National Assessment Planning Project (NAEPP), wherein a consortium of 18 national organizations interested in education worked together to examine how NAEPP might be expanded in order to produce state-by-state comparisons of student achievement. In this case, rather than focusing on developing an indicator system, the effort was directed toward developing more and better indicators of one feature of the system. The international indicator development process of the OECD project provides yet another example of a consensus approach to indicator selection. In this project, representatives from member nations formed networks around several domains of the educational system in order to reach agreement about the important indicators in each domain.

The advantages of a consensus development approach lie in the political support engendered, through the incorporation of different perspectives and increased ownership, and in the more likely match between selected indicators and policymakers' information needs. The primary disadvantage is that the resulting indicators may not be comprehensive or capable of relational analyses. To be successful, indicator selection probably needs to be grounded on consensus about which set of model-based indicators can provide useful information that is feasible to collect.

Developing Component Measures. The component measurement stage translates concepts into measures. It answers questions such as: What test questions should be asked to obtain an indicator of student literacy? What type of information could be gathered from teachers to ascertain their teaching strategies? From whom should information about student exposure to language and literature be gathered?

The indicator literature (Johnstone, 1981) identifies threats to the internal validity of indicators at this stage: (a) fractional measurement—partial measurement of a multidimensional concept; (b) misspecification of the concept or measure, as when one concept is substituted for another that is more difficult to measure; and (c) changes in concept meaning over time or setting. Both political and technical factors can encourage fractional measurement or concept misspecification. Political factors influence initial selection, as some measures are viewed as more credible—and therefore more likely to be used—than others (e.g., policymakers consider objective measures more credible than subjective measures). Likewise, technical considerations arbitrarily favor more easily measurable indicators over others. Political factors, such as corruptibility, affect concept meaning. For example, an achievement test designed to sample content may be corrupted when teachers *teach the test* because of political pressure to improve scores. As the test material no longer randomly represents a larger content domain, the inferences from test scores to content knowledge change.

Data Collection. Data collection involves identifying the targeted sample, or population, and specifying administration procedures. One sampling consideration is whether adequate representation of the units of interest requires a sample or a census. Sometimes an ad hoc decision is made. For example, because many states administer commercial achievement tests to all (available) students at a given grade for instructional purposes, they use these census data to meet public accountability pres-

sures as well. However, targeted samples potentially offer precise and valid estimation of important student (or teacher or school) characteristics in a cost-effective manner that focuses respondent burden on a subset of schools or districts rather than distributing it throughout the educational system. Such samples afford in-depth data collection that can be more responsive than a costly and burdensome census to policy needs. For these reasons, national data collection projects (e.g., NAEP, NELS, and HS&B) increasingly rely on representative sample surveys.

Whether a sample or census is used, a related sampling issue involves clear specification of inclusion–exclusion criteria. Consider further the example of states' census collection of student achievement data. Criteria for handling special students (e.g., limited-English speaking, special education, highly mobile, and absent) affect the validity of inferences based on the data.

Administration procedures governing data collection and recording have a direct impact on the quality and corruptibility of the information obtained (Burstein, Freeman, & Rossi, 1985). Procedures must be carefully specified, and ongoing validation efforts are required to protect against intentional and unintentional corruption (McDonnell, Burstein, Ormseth, Catterall, & Moody, 1990). Regardless of the data collection method, accurate and credible data require a high degree of commitment and cooperation from state, district, and school officials and from the technical community.

Construction and Scaling. Once component measures are identified, how are components combined to form the actual indicator? Indicators may be single statistics or composites. Single statistics may prove useful, as when average teacher salary or total expenditures provide information on educational resources. More complex than single statistics, composites measure combinations of related events or characteristics and report a single value (Carley, 1981; Johnstone, 1981; Oakes, 1986). For example, the U.S. Department of Education combined students' socioeconomic characteristics to create a composite index of a state's *educational need.* Composite indicators also can provide information about relationships between two or more varying factors (e.g., pupil–teacher ratios). The distinctions between single and composite indicators, however, are not always exact. Test scores—generally horizontal aggregates of items or subscores—are considered a single statistic in most conceptions, despite their combined nature.

The complexity of creating composites increases in situations where the component measures are dissimilar, because choices must be made about the elements to include and the appropriate weight to assign each element. Either empirical (e.g., regression analysis or factor analysis) or conceptual methods (e.g., expert judgment or linguistic analysis) are utilized to combine measures and assign weights. Technical discussions of this process fail to reflect its value-laden nature. For instance, empirical procedures rely on the particular variables and sample involved (Rossi & Gilmartin, 1980); and the empirical results themselves drive the weighting process.

In addition to the implicit political aspects of indicator construction, technical issues abound. Measures must be placed on a common scale for comparison or combination, but no single, external scale (such as that provided economists by monetary units) exists in education. A related issue involves the unit of measurement and reporting. Often measures of a concept are obtained from different levels in the educational system and thus represent different units of measurement with their associated analysis problems. These technical difficulties must be resolved before the investigator can proceed with the development process.

Contextualization. Once constructed, the indicators of a specific aspect of education are placed in an interpretive framework, an *indicator system.* Such a system provides a context that gives meaning to the individual indicator by introducing analytical links with other important features of schooling.

Contextualization serves a number of purposes. Disaggregation by ascriptive characteristics permits assessment of differential impact. Reporting the quantity of course work in the cross-classification of ethnicity, gender, and social class exemplifies this purpose. Ascertaining whether the relationship between course work and performance on measures of student learning varies across schools with different ethnic and sociodemographic concentrations illustrates another form of contextualization. This type of information permits fairer comparisons, because social and economic conditions of communities, states, or regions are considered, rather than attributing performance differences solely to the quality of the educational system (Burstein, 1988a, 1988b; Elliott, 1989; Haertel, 1988).

Contextualization for the purpose of making fairer comparisons raises a difficult political issue: How can the reality of differences be built into a system of indicators and accounted for when comparisons are made without institutionalizing lower expectations for some schools and their students? Not all states, schools, teachers, and students start out even. Some systems face greater difficulties than others in educating; some students face greater difficulties becoming educated. Out of a sense of fairness to states and to local schooling systems, indicators should be sensitive to these variations. Yet, out of a sense of fairness to children in various circumstances, indicators should account for the distribution of educational outcomes and processes among various student groups—indicators that can monitor the system's equity. Indicators that include adjustments for the educative difficulties that various schools face run the risk of institutionalizing low expectations for some students. But indicators that do not account for these important differences place an undue burden on some schools by ob-

securing the real achievements of schools with the most difficult circumstances and inflating the accomplishments of schools working under far easier conditions.

The technical strategy used to address indicator variability because of influence from other indicators in the system involves stratifying or clustering units (students, schools, etc.) according to particular contextual factors (ascriptive characteristics of students, schools, and communities). Comparisons then are limited to similar schools or districts within the same cluster. From a policy perspective, clustering or classification is appropriate when the context effect is meaningful and of substantive interest.

Clearly, the contextualization process depends on the availability of auxiliary information. Routinely collected uniform information characterizing students (e.g, gender, ethnicity, language proficiency, and special status), schools (e.g., enrollment and socioeconomic status), programs (e.g., Chapter I, pupil–teacher ratio, gifted, coverage, and homework), and districts (e.g., community type, enrollment, and funding) typically are needed.

Many aggregation issues are related to contextualization. For any level (e.g., district or state), within-group variability may be so great that aggregation of the classification variables to the group level can be misleading. The mean level of individuals' characteristics may not capture the school context in cases where the individuals are diverse, so that the metric used is of particular concern. Background characteristics are quite susceptible to construct changes at different levels of aggregation. For instance, parents' educational level may represent potential home resources in support of student learning at the individual level but when aggregated to the school level may indicate community resources available to the school. In addition, the various grouping characteristics may interact, requiring further contextualization. Separate investigations at each level are required if each context is of substantive interest and, if not, empirically to justify pooling across characteristics.

Communication. The final stage of indicator development includes summarizing and reporting. Decisions involve the form of presentation, the reporting frequency, and the intended audience.

The presentation format affects the message that an indicator carries. Raw, unelaborated columns of numbers serve as both a barrier to those uncomfortable with numbers and a license for personalized interpretation to those more adept at their translation. The shift to alternative pictorial or symbolic representations of numerical indicators penalizes and enfranchises different users. Written interpretive statements accompanying any numerical or pictorial display also change the circumstances: They accentuate verbal knowledge, thus empowering some users but at the cost of potentially influencing users' interpretations (Carley, 1981; de Neufville, 1975). These format choices represent different locations on the *information-to-knowledge* horizon. Selection of a particular format expands or contracts the audience and its degree of empowerment. Generally, the move from uninterpreted numbers to pictorial displays with written explanations increases control over the message communicated while expanding the policy audience who can comprehend the substance and significance of the indicator.

Frequency of data reporting is inextricably linked to frequency of data collection, although not all data collected needs to be reported each time. Up to a certain (unidentified) point, more frequent reporting offers the advantage of maintaining public attention to the issues that indicators inform. Timely reporting—reporting that provides information when policymakers are considering related decisions—also influences the reporting cycle and generally encourages more frequent data collection and reporting. But frequency also increases costs and burden, both in collection and in the machinery to generate the report. Policy relevance and meaningful fluctuation of the indicator provides the bases for determining data collection and reporting frequency.

Finally, who reports the indicators and who makes each of these decisions is an issue. The credibility and understandability criteria of earlier stages apply to the communication stage as well. Credibility is affected by the group that is reporting the indicators. Indicators developed by government agencies and reported by politicians often lack public credibility, especially when political and statistical interpretations differ. For policymakers, understandability and utility are primary at this stage. Nonuse of indicator information has been associated with issues of accessibility, level of detail, appropriateness for current policy issues, timeliness, and interpretability of indicator reports. Different audience needs and perceptions place multiple, and sometimes contradictory, criteria on any reporting system.

Consequences of Indicators and Future Directions. The demand for improved information about the educational system coincides with an increased concern for the system's quality and accompanying reform efforts. Indicators are expected to provide objective information that guides policymaking, drives educational practice, and informs the public. If they can achieve these aims, indicators promise better control, quality assurance, and efficiency.

But these hopes for indicators may be exaggerated. Oakes (1986) cautions that "educational organizations may be far more complex, dynamic, and interacting than data about discrete, or even mechanically-linked parts, can convey" (p. 36). The social research community acknowledges the difficulties associated with measuring important features of complex systems and the short-lived nature of measures taken in dynamic systems. In addition, data that capture important characteristics of schooling (e.g., educational contexts and processes) remain virtually unavailable at the national level. Hence current data possess a limited ability to guide policymak-

ing. Moreover, the highly politicized atmosphere created by competing interests in the educational system indicates that indicator development is subject to political pressures.

These limitations suggest that indicators do not offer a remedy for all the ills of the educational system. However, if carefully developed and thoughtfully applied, indicators can aid the dialogue among citizens, policymakers, and educators. Although indicators cannot offer definitive interpretations or predictions, they can bring new knowledge to bear on issues and suggest possible solutions. These modest purposes imply a more limited but still substantial contribution for indicators—one that warrants sustained effort.

Leigh Burstein
Jeannie Oakes
Gretchen Guiton

See also Policy Analysis; Research Impact on Educational Policy; State and National Assessment; Uses and Abuses of Testing.

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THE CRESST Line

Newsletter of the National Center for Research on Evaluation, Standards, and Student Testing

A Publication of UCLA's Center for the Study of Evaluation and Graduate School of Education & Information Studies

Inside

Mailing List Update

We are in the process of updating the CRESST mailing list. Postcards were mailed out recently to all our CRESST friends. Please fill out and return your postcards as soon as possible. If you have not received a card, or you would rather respond by e-mail, please send your complete address information to Mary Wilby at mary@cse.ucla.edu.

Winter 1998

From the Directors:

Back to Basics—Indicators as a System

Robert L. Linn

Eva L. Baker

It seems fitting to go back to the basics underlying the work of both CRESST and our broader community. The problem we collectively address is how to gather and interpret information so that we develop a good understanding of the status of educational quality so we can work together to improve the impact of services to our students and other clients. Sometimes it seems that we lose the big picture and, instead, get hopelessly caught up in the strategy or technique of the moment, whether it is portfolios, performance-based testing, or which kind of measure of national attainment is best. Of course, exploring new techniques to expand and improve our understanding of educational quality is not trivial, so long as we remember why we are attending to one or another option. Let us revisit the concept of indicators, one that has come around again, as an example.

Indicators as a System

States, school districts, and schools are creating or exploring sets of indicators that can be useful in communicating to parents, students, teachers, the public, and policy makers about the course of educational progress. These indicators include test scores, demography, reports of absences, mobility, course taking patterns, numbers of credentialed teachers, school size, and other summaries of the day-to-day life and accomplishments of a school.

Two things are especially striking to us. First, some indicators (e.g., attendance and achievement test results) are expected to be directly under the control of schools or at least are intended to be outcomes for which schools are held accountable. Other indicators (e.g., proportion of teachers with certifica-

(see From the Directors, page 2)

(From the Directors...from page 1)

tion in the subjects they are teaching) are only marginally under the control of schools because they depend on larger system policies or financial considerations not controlled by the school. Still others (e.g., student demographics or student mobility) are clearly outside the control of schools. Second, when no distinctions are made among types of indicators, they do not really add up to much useful information.

The basic idea that we want to emphasize is that information is most useful when you can do something about it. Here is where the analogy of school report cards and student report cards weakens, for most of us expect that our children can improve their grades by effort and perseverance. Do we expect that schools can change their grades based on the indicators in use? Treating indicators that schools can change and ones that they can't on the same footing undermines the usefulness of the collection of indicators.

To be useful, an indicator system needs to make clearer distinctions among types of indicators. A categorization of indicators into (a) ones that schools are expected to change and for which they are to be held accountable, (b) ones that are influenced only indirectly by schools, and (c) ones that are clearly outside the control of the school would enhance the utility of the indicator system.

MAKING INDICATOR SYSTEMS USEFUL

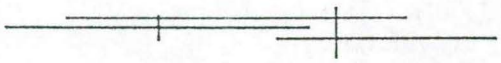
Indicators in the first category are likely to be most useful because they provide information that schools can do something about. Indicators in the third category are useful mainly as information about context or co-statistics that may enhance interpretation of indicators that schools can be expected to do something about. Caution is needed, however, to ensure that the indicators intended to provide context or to be used as co-statistics do not become convenient excuses for or self-fulfilling prophesies of poor performance on the indicators under the school's control.

Consider some criteria to improve the design and use of indicator systems.

1. Indicator systems should be multilevel, but set up like a pyramid—fewer indicators as the distance from the school grows.
2. Clear distinctions should be made among indicators under the control of schools and ones that are intended to be used as measures of context or as co-statistics for interpretation of indicators in the first category.
3. Systems should include guidance on the proper interpretation of indicators, cautioning specifically against the use of indicators outside the control of schools as excuses for poor performance or as the basis for self-fulfilling prophecies about student achievement.
4. Systems should be designed to maintain the same definitions of indicators. For example, drop outs, at every level—school, cluster, district, state—and over a reasonable period of time. Ten years, for instance.
5. Longitudinal formats, secured so that privacy can be appropriately maintained, should be the design of choice for achievement and school process data.
6. Indicators should relate as specifically as possible to plans at local levels. Additional indicators should be included, for example, parent participation and homework, if they reflect important local goals.
7. Along with available test results, indicator systems should reflect instructional effort in academic matters. They should report types of assignments, and evaluated excellent and typical work.
8. Results for an indicator should be compared to a benchmark: a goal, attainment of another institution, growth over a particular period. Without a comparison, the indicator is usually not too helpful.

9. Indicators should be clustered to show what elements are under the school's or institution's control, what are background variables, and how the service indicators relate to proximate and long-term measures of attainment.

Big and small districts, large, complex schools and small focused ones have the responsibility not only to report easily collected data, but to find the right information and report it in such a way *that someone can do something about it.* Otherwise, as a number of our friends in evaluation have said over the years, why bother?



SAVE THE DATE!

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Special Journal Issue Focuses on Assessment

As alternative forms of student assessment are put into practice, teachers face increasing demands to "align their teaching and assessment practices with new tests," notes CRESST researcher Pamela Aschbacher, guest editor of the latest issue of *Theory Into Practice* (TIP). This special TIP issue, "New Directions in Student Assessment," is intended to help teachers understand and apply central concepts in student assessment.

The journal's authors discuss key assessment issues over a variety of subject areas and grade levels. The articles include:

Model-Based Performance Assessment
Eva L. Baker, CRESST/UCLA

New Forms of Classroom Assessment: Implications for Staff Development
Hilda Borko, CRESST/University of Colorado at Boulder

Oral Language Assessment in the Classroom
Frances A. Butler and Robin Stevens, CRESST/UCLA

Assessing New Assessments: How Do They Measure Up?
Joan L. Herman, CRESST/UCLA

What Happens When School Reform and Accountability Testing Meet?
Karen Mitchell, National Research Council

Cognitive Science, Expert-Novice Research, and Performance Assessment
David Niemi, CRESST/UCLA

Beyond "Breadth and Depth": Subject Matter Knowledge and Assessment
Samuel Wineburg, University of Washington

(see Journal, page 7)

HANDBOOK OF EDUCATIONAL TERMS AND APPLICATIONS

Arthur K. Ellis
Jeffrey T. Fouts

possible, the education should take place in the regular classroom. If this proves not feasible because of the severity of the handicap, then the least restrictive environment, usually some type of specialized setting, is to be used. The law also includes due process procedures to protect against inappropriate placement or treatment. Because both federal funding and federal law are involved, certain sanctions can be levied by the federal government against states or school districts for noncompliance.

EDUCATIONAL INDICATORS

Educational indicators are a type of evidence, apart from traditional measures such as test scores, of the success or lack thereof of a school program or curriculum experience. Typical educational indicators include attendance/absenteeism, referrals for disciplinary reasons, truancy notices, dropout rate, voluntary participation in activities, and referrals to school counselors.

EDUCATIONAL PRODUCTIVITY THEORY

Educational productivity theory represents a comprehensive framework for the analysis of the academic productivity of American schools. Herbert Walberg and his associates at the University of Chicago analyzed thousands of research studies and examined numerous variables to determine the causes of learning. His resulting Theory of Educational Productivity identified nine factors divided into three broad categories that increased affective, behavioral, and cognitive learning. The three categories and nine factors included aptitude with the factors of ability, development, and motivation; instruction with the factors amount and quality; and environment with the factors home, classroom, peers, and television. Walberg's concern was to identify those factors of most importance and to maximize school learning by focusing efforts on those most important factors under the direct control of the schools.

HOUSE FILE 2272

AN ACT

REQUIRING THE STATE BOARD OF EDUCATION TO ADOPT RULES RELATING TO THE INCORPORATION OF ACCOUNTABILITY FOR STUDENT ACHIEVEMENT INTO THE EDUCATION STANDARDS AND ACCREDITATION PROCESS.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF IOWA:

Section 1. Section 256.7, Code 1997, is amended by adding the following new subsection:

NEW SUBSECTION. 21. Develop and adopt rules by July 1, 1999, incorporating accountability for student achievement into the standards and accreditation process described in section 256.11. The rules shall provide for all of the following:

a. Requirements that all school districts and accredited nonpublic schools develop, implement, and file with the department a comprehensive school improvement plan that includes, but is not limited to, demonstrated school, parental, and community involvement in assessing educational needs, establishing local education standards and student achievement levels, and, as applicable, the consolidation of federal and state planning, goal-setting, and reporting requirements.

b. A set of core academic indicators in mathematics and reading in grades four, eight, and eleven, a set of core academic indicators in science in grades eight and eleven, and another set of core indicators that includes, but is not limited to, graduation rate, postsecondary education, and successful employment in Iowa. Annually, the department shall report state data for each indicator in the condition of education report.

c. A requirement that all school districts and accredited nonpublic schools annually report to the department and the

local community the district-wide progress made in attaining student achievement goals on the academic and other core indicators and the district-wide progress made in attaining locally established student learning goals. The school districts and accredited nonpublic schools shall demonstrate the use of multiple assessment measures in determining student achievement levels. The school districts and accredited nonpublic schools may report on other locally determined factors influencing student achievement. The school districts and accredited nonpublic schools shall also report to the local community their results by individual attendance center.

RON J. CORBETT
Speaker of the House

MARY E. KRAMER
President of the Senate

I hereby certify that this bill originated in the House and is known as House File 2272, Seventy-seventh General Assembly.

ELIZABETH ISAACSON
Chief Clerk of the House

Approved May 6, 1998

TERRY E. BRANSTAD
Governor

HF 2272

280.12 Goals and plans—evaluation—advisory committee.

1. The board of directors of each public school district and the authorities in charge of each nonpublic school shall:
a. Determine major educational needs and rank them in priority order.
b. Develop long-range goals and plans to meet the needs.
c. Establish and implement short-range and intermediate-range plans to meet the goals and to attain the desired levels of pupil performance.
d. Evaluate progress toward meeting the goals and maintain a record of progress under the plan that includes reports of pupil performance and results of school improvement projects.
e. Report progress made under the plan at least annually to the advisory committee appointed under subsection 2, the community and the department of education. Make other reports of progress as the director of the department of education requires.
2. In meeting the requirements of subsection 1, a board of directors or the authorities in charge of a nonpublic school shall appoint an advisory committee to make recommendations to the board or authorities. The advisory committee shall consist of members representing students, parents, teachers, administrators, and representatives from the community.
[C75, 77, 79, 81, § 280.12]
85 Acts, ch 212, §8

280.18 Student achievement goals.

The board of directors of each school district shall adopt goals to improve student achievement and performance. Student achievement and performance can be measured by measuring the improvement of students' skills in reading, writing, speaking, listening, mathematics, reasoning, studying, and technological literacy.
In order to achieve the goal of improving student achievement and performance on a statewide basis, the board of directors of each school district shall adopt goals that will improve student achievement at each grade level in the skills listed in this section and other skills deemed important by the board. Not later than July 1, 1989, the board of each district shall transmit to the department of education its plans for achieving the goals it has adopted and the periodic assessment that will be used to determine whether its goals have been achieved. The committee appointed by the board under section 280.12 shall advise the board concerning the development of goals, the assessment process to be used, and the measurements to be used.
The periodic assessment used by a school district to determine whether its student achievement goals have been met shall use various measures for determination, of which standardized tests may be one. The board shall ensure that the achievement of goals for a grade level has been assessed at least once during every four-year period.
The board shall file assessment reports with the department of education and shall make copies of these reports available to the residents of the school district.
87 Acts, ch 224, §56