Summary and Conclusions

OTL standards may be a two-edged sword. On the one hand, they can provide a vision for specific challenging curriculum content and for effective instructional practices, based on the latest research. During this time of intense school reform, mechanisms for clarifying the goals of reform and practices leading to those goals are much needed. Since OTL indicators provide an inventory of the curriculum and instruction actually enacted, they can also describe the extent to which students of differing ethnic backgrounds have access to similar opportunities. On the other hand, OTL standards can be used as evaluative criteria, coercing teachers to adopt practices for which they may not have received sufficient preparation and that may be instructionally inappropriate in some situations.

During this time of intense school reform, mechanisms for clarifying the goals of reform and practices leading to those goals are much needed.

If OTL standards serve as a focus for collegial discussion within a professional environment, they can contribute much to school improvement. If, in contrast, OTL standards are used to control teachers from a distance without providing appropriate professional development and financial resources, they would likely alienate teachers, and, at the same time, shift attention away from student outcomes and once again to school inputs as ends in themselves.

To use OTL standards productively as vision statements and as indicators of progress toward reform, it is important to avoid making public comparisons of OTL between specifically named schools and between specific teachers within schools. When these comparisons are made, they must be made in a collegial environment where teachers and administrators have accepted responsibility for school improvement. Public comparison on OTL should be used to document general trends across large numbers of schools, courses, or groups of students, and to stimulate professional discussion and reflection within schools, detached from the sting of high stakes accountability.

For Further Reading

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Through syntheses of previous research, analyses of existing data, and new empirical studies of education reform, the Center will focus on six critical issues for elementary, middle and high schools: How can schooling nurture authentic forms of student achievement? How can schooling enhance educational equity? How can decentralization and local empowerment be constructively developed? How can schools be transformed into communities of learning? How can change be approached through thoughtful dialogue and support rather than coercion and regulation? How can the focus on student outcomes be shaped to serve these five principles?

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In the fall and spring of each year, the Center publishes an issue report which offers in-depth analysis of critical issues in school restructuring, distributed free to all persons on the mailing list. In addition, three "briefs" targeted to special audiences will be offered yearly. Our 1993 bibliography, currently available, will be updated each year and is distributed free on request. Occasional papers reporting results of Center research will be available at cost. To be placed on the mailing list and receive *Issues in Restructuring Schools,*please contact Karen Prager, Dissemination Coordinator, Center on Organization and Restructuring of Schools, University of Wisconsin, 1025 W. Johnson Street, Madison, WI 53706. Telephone: (608) 263-7575.

Brief No. 7 Fall 1993

Opportunity to Learn

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Brief to policymakers

Opportunity to Learn

by Andrew Porter

Increasingly, new goals for American education are being communicated through curriculum and achievement standards. New national curriculum standards have been published or are underway in every core academic subject. States are revising their curriculum frameworks and assessment programs to be consistent with national education Goal Three which calls for competency in challenging subject matter for all students. The hope is that these curriculum and student achievement standards will lead teachers to bring their instruction into alignment with the new curriculum standards, and that student performance will rise to meet the new achievement standards. Many believe that for curriculum and achievement standards to have this effect, high stakes for students, teachers, and schools, tied to student performance, will be necessary.

To maximize fairness and equity for students, another set of standards has been proposed, opportunity to learn (OTL) standards. OTL standards are to represent what schools and teachers must do if the new curriculum and achievement standards are to be met. For some this translates into lower class size, certified teachers, more money, and the like. For others, and as argued here, this translates into more specific standards for content and pedagogy. The U.S. Congress is calling for opportunity to learn standards as a part of President Clinton's Goals 2000 legislation. The National Governors' Association has funded several states to develop OTL standards as demonstrations. The 1992 report of the National Council on Education Standards and Testing was the first public report calling for such standards.

This brief is to inform the policy debate about OTL standards. Three possible purposes are presented. One of these, OTL indicators, is illustrated through examples of monitoring curriculum reform in high school mathematics and science.

RIEF NO. 7 FALL 1993

Three Possible Uses of OTL Standards

First, OTL standards might be the basis for school-by-school accountability. Second, OTL standards might provide an indicator system that would describe the extent to which teachers across districts, states, or larger regions implement instruction consistent with curriculum standards. Third, OTL standards might present a clearer vision of challenging curriculum content and pedagogy for all students.

Accountability

Of the three possible uses, formal school-by-school accountability is both the most talked about and the least attractive. A district or state could hold schools accountable for delivering adequate OTL to all students. The U.S. Congress is considering holding states accountable for having approved OTL standards; state participation in certain federal funding programs may be conditioned on approved OTL standards.

States, districts, and other organizations have a long, unproductive history of using inputs rather than student outcomes to hold schools accountable. Examples are school accreditation programs and detailed lists of state requirements for school practices that exist in virtually every state. These old notions of OTL, defined in terms of inputs (e.g., number of certified teachers, size of library) have not had the desired effects. To the contrary, they have invited micromanagement that has dissipated energy away from high quality assessment, curriculum, and instruction. As a result, there has been a shift toward school accountability for student outcomes, rather than inputs. Using opportunity to learn standards for school accountability could have the negative effect of shifting attention away from outcomes and once again back to inputs.

Indicators

There are at least three reasons for creating a system of OTL indicators. One is simply to describe with some precision the kinds of educational opportunities schools provide. Citizens and taxpayers have a right to this information. A second reason is that OTL indicators can help to chart the progress of school reform. The NCTM Curriculum and Evaluation Standards for School Mathematics call for major changes in mathematics education. OTL indicators, by showing the kind of curriculum and instruction actually delivered, will inform us about the degree of success in achieving these changes. A third reason for OTL indicators is to provide information that can offer explanations when student achievement goals are not reached. OTL indicators may point to possible causes and thus to possible solutions for inadequacies in school outputs. The users of OTL indicator information could range from the National Goals Panel, to state reformers, to school principals and individual teachers who want to reflect on their practices.

Vision

OTL standards can provide a clearer vision of good practice. If schools and teachers are expected to accomplish the massive curriculum reform of offering “ambitious content” for all students, they will need a great deal of support. But first and foremost, they will need to have a clear understanding of what changes are necessary. OTL standards can offer detailed accounts of specific curriculum content, effective instructional practices and school strategies that support the goal of ambitious content for all students. Such standards would guide school reform and staff development. An excellent example is NCTM’s Professional Standards for Teaching Mathematics (1991). Without such standards it will be difficult for principals and teachers to visualize coherent and professionally solid paths of curriculum improvement.

OTL Indicators

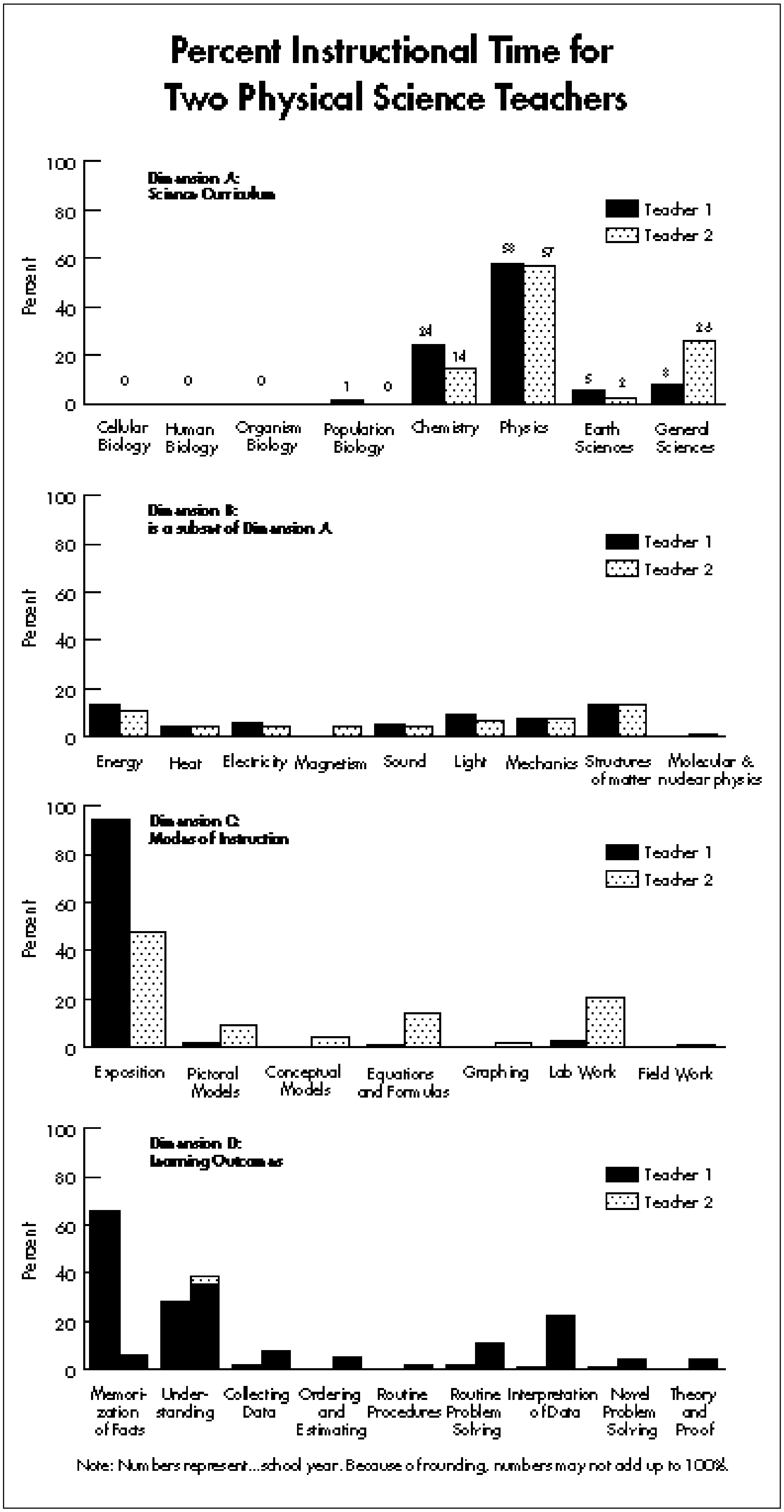
What is a good indicator of OTL? Amount of instructional time on specific topics? The particular books studied? Availability of equipment (computers, lab materials)? Access to good teachers? The main criterion for selecting indicators should be utility for predicting student achievement. The best predictors of student achievement that are within a school’s control are the content actually taught, the instructional strategies used, and the standards for achievement evident in testing and grading. In combination, the time and emphasis given to these matters define opportunity to learn. Some possible OTL indicators are described below.

A Language for Describing OTL

If OTL is to become a focus for school improvement and if indicators of OTL are to be used to keep track of progress, then languages for describing OTL must be developed. Recently developed curriculum standards are a good start, but they are too general and incomplete to describe the enacted curriculum in ways that predict student achievement.

More specific languages for describing high school mathematics and science illustrate the kind of indicators that can be useful. Each subject is represented by a four-dimensional taxonomy. The first dimension lists the general domains of content unique to each subject. Dimension A of math has ten levels including arithmetic, algebra, and statistics. Dimension A of science has eight levels including four types of biology, chemistry, and physics. Dimension B breaks each level of Dimension A into greater detail. For example, levels of B within statistics include collecting data, distributional shapes, central tendency, variability. Levels of B within physics include heat, electricity, sound, light. Dimensions C and D, the same for science and mathematics, represent modes of instruction and intended learner outcomes and are shown in the side bar.

The specific items listed under the four dimensions capture the curriculum recommendations of



subject matter experts and are also familiar to teachers. An advantage of common items across the two subjects for Dimensions C and D is that subjects can be compared on the extent to which they promote active student learning.

Measuring OTL

One way to measure OTL is through teacher logs. In a recent national study on high school math and science, a daily log form asked teachers to record several indicators of OTL such as those in the sidebar: time spent on up to five topics of content, amount of time and emphasis on different modes of instruction and different student activities (including assigned homework), and the portion of class period spent on activities not directly related to the academic content of the course (e.g., announcements, attendance). A manual to guide use of the logs was provided for each teacher. Prior to using the logs, each teacher received approximately one hour of instruction in the OTL language.

The chart above indicates how teachers can differ. The two teachers of physical science taught in different states. Both put heaviest emphasis upon physics and secondarily on chemistry, but Teacher 2 put somewhat less emphasis upon chemistry and instead put more emphasis upon general science. Despite these similarities, Teacher 1 used almost entirely lecture and student reading (exposition) as a mode of instruction with two-thirds of instructional time devoted to memorizing facts; while Teacher 2 spent only 50 percent of the time on lecture and student reading (exposition) and 21 percent of the time on lab work. For Teacher 2, this resulted in much less emphasis upon facts and much greater emphasis upon learning to collect and interpret data.

The teacher logs provided information that agreed remarkably well with independent classroom observations. Completing a log requires approximately five minutes of a teacher's time each day for each course/subject described. A questionnaire survey was also used to explore a less time consuming way of collecting such data. The questionnaire asked teachers to report retrospectively on a semester of instruction, instead of each class period, using several of the dimensions in the log. Correlations between questionnaire and log data were reasonably high.

Whether through teacher logs or questionnaires, measuring OTL depends on teachers' reports of their practices. These reports have proven accurate when validated against reports of independent observers. Teachers' reports would probably continue to be valid when the data are used for professional development and school improvement. But if the information were used for coercive monitoring and high stakes accountability, this would surely compromise the integrity of teachers' reports.

Findings Across Many Schools

The study using teacher logs involved 18 high schools (grades 9 through 12) in 12 districts in six states in the 1989-90 and 1990-91 school years. In each school, approximately two mathematics and two science teachers kept logs, yielding a sample of 62 teachers.

Both mathematics and science courses were dominated by exposition, either verbal or written. In mathematics, exposition was especially high in the introductory courses, consuming two-thirds to three-fourths of instructional time. In science, exposition was less predictable by course level. In both subjects and for virtually all of the course types studied, students spent the majority of their time either being talked to by the teacher or working independently at their desks. On average for both math and science, one-third of the time was spent in seatwork, while only 25 percent of the time was spent in class discussion and small-group work.

What little lab work was done in mathematics consisted almost entirely of drill and practice at a computer terminal. In science, half of the courses spent 5 percent or less of instructional time in lab work. Neither subject involved students much in graph work, with only 1 percent of instructional time spent on graph work in science and 4 percent of instructional time for graph work in mathematics.

The picture for intended student outcomes parallels the picture for modes of instruction. In mathematics, the emphasis is on understanding and computation, while in science, the emphasis is on memorizing facts and understanding. In mathematics, only 4 percent of instructional time is given to collecting and interpreting data. Only 2 percent of instructional time is devoted to students working with novel problems. On average, no instructional time is allocated to students learning to develop proofs, not even in geometry. In science, the picture is similar. Essentially no time is allocated to students' designing experiments or building and revising theory. For one-third of the science courses studied, no time was allocated to data collection and data interpretation.

These descriptions illustrate the value of OTL indicators in monitoring progress in curriculum reform. At least for the high school mathematics and science classes studied, practice was a far cry from today's recommendations from mathematics and science educators.

An exception to this profile of low quality instruction was discovered in sections of California's Math A program. Math A was designed to serve as an intermediate step for students who might otherwise have taken ninth-grade general mathematics but might eventually take algebra. The two sections of Math A in the study stood out from all other math courses as having a distinctive dual emphasis on algebra and geometry. They also had an unusually high emphasis on mathematical modelling and an unusually low emphasis on lecture. Similarly, they placed high emphases on collecting data and solving novel problems and less emphasis on computation. These two classes may or may not represent typical practice in Math A classes, but these findings are consistent with the formal design of the course and with the curriculum reform aimed toward challenging content for all students. Implementation of the Math A syllabus was not complete, however. The 13 designated units include instruction on both probability and statistics, but neither of these was taught in either of the two Math A sections studied. Clearly, data on OTL show that implementation of Math A was highly successful in these classrooms; the data also make clear what needs to be done to make implementation even better.

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