

# State Policies on Testing and Assessment

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**A**s with any new policy, the ultimate effects of the shift in federal policy on accountability to performance standards will depend on how it is implemented in state and local programs of vocational education. The role of the states will be pivotal in the implementation process because of their responsibilities for setting the performance standards and adopting policies of testing and assessment measuring progress.

Beyond the initial definition of the performance standards and measures for a state, successful implementation will require the development of substantial state resources for assessing the academic and occupational skills acquired by students. In many states, new resources will be needed.

As indicated in chapter 2, the legislation requires the adoption of outcome measures for learning and competency gains, and at least one other area of competency attainment or employment outcomes. Most states have adopted sets of standards and measures in at least four or five areas, involving some combination of gains in or attainment of academic skills, gains in and/or attainment of occupationally specific skills, attainment of general work or employability skills, rates of program completion, rates of job placement, and status of employment or further education.<sup>1</sup> In most cases, all except the last three types of outcomes will require information about the performance of individual students from some form of testing or assessment. The National Center for Research in Vocational Education's (NCRVE) recent tabulation of the standards adopted by the states shows



<sup>1</sup>Mikala L. Rahn et al., "State Systems for Accountability in Vocational Education," paper prepared for the U.S. Department of Education, Office of Vocational and Adult Education, December 1992.

that a majority of them at least will require some information from testing and assessment.<sup>2</sup>

Consequently, the eventual success of performance standards in stimulating reform and improvement in vocational education will depend on the resources for testing and assessment within state and local programs. If no resources exist or the quality of the information from testing and assessment is low, conclusions derived will be faulty. The testing or assessment process might not be focused on the most important outcomes of the local programs, or the results may not be dependable because of the instruments employed, how they were presented to students or administered, or how the responses of students were rated or scored. The problems could be random, in which case they might not be threatening to the integrity of the resulting information, or they could be systematic, in which case they would be a problem. Evidence from academic education shows that when the stakes for testing and assessment are sufficiently high, the process of interpreting the results can become highly politicized and the results can be **distorted**.<sup>3</sup>

This chapter presents the results of a “first cut” effort by the Office of Technology Assessment (OTA) to describe the policies of states on testing and assessment for the academic and occupational skills of vocational education students, and the state plans for expanding their policies on testing and assessment by 1995. The data presented come from a survey conducted by OTA, along with interviews with state personnel and others who are knowledgeable about practices of testing and assessment in vocational education.

The results presented serve three main purposes. One is to describe the range of current practices of testing and assessment in vocational education. Partly, this is done through comparing

current practices with practices of testing and assessment in academic education. There are clear differences between the philosophies and origins of testing and assessment in academic and vocational education that are important to keep in mind. The second purpose is to describe the plans of states for expanding their resources for testing and assessment in response to the requirements for performance standards in the Perkins Amendments, and other forces at work at the state and local levels in vocational education. The third is to consider the correspondence, or lack thereof, between the emerging policies of states on testing and assessment and two reform goals: integrating academic and vocational education, and broadening the technical skills around which vocational education is organized.

The testing and assessment policies of states are described in terms of two dimensions. One dimension is the four types of academic and occupational skills, and the other is the extent to which methods of written testing or assessment are emphasized. These categories of academic and occupational skills are important because they are related to the integration of academic and vocational education, and broadening the technical skills around which vocational education is organized. Whether the state policy emphasizes written testing or assessment is important because of the potential effects on the content and character of instruction in vocational education, and because of validity and reliability issues.

For the purposes of this study, *written testing* will be defined to be any method of examining students in which the format of the answers to the questions asked are multiple choice, matching, or some other method of filling in a **small blank** or selecting the correct response from a given list of responses. Such measuring instruments are *closed ended*. *Assessment* will be defined as the

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<sup>2</sup> Ibid., table 2.

<sup>3</sup> U.S. Congress, Office of Technology Assessment, *Testing in American Schools: Asking the Right Questions*, OTA-SET-5 19 (Washington, DC: U.S. Government Printing Office, February 1992), ch. 2; and Daniel Koretz, “Arriving in Lake Wobegon: Are Standardized Tests Exaggerating Achievement and Distorting Instruction?” *American Educator*, vol. 95, No. 2, 1988, pp. 46-52.

observation and rating or judging of student performances to ascertain academic or occupational skills, following some systematic procedure of measurement.

## DESIGN AND METHODOLOGY OF THE STATE SURVEY

The OTA survey was conducted by telephone from February through April of 1993. It had two parts: 1) a series of closed-form questions to obtain basic descriptive information about the individual components of each state's program of testing and assessment, and 2) further discussion with the state respondents to develop a brief, written description of the nature, form, and purposes of each of the components and how they are related to each other. Both the coded questionnaire responses and the qualitative descriptions were sent back to each state for verification of the accuracy and completeness of the information. The respondents were the state directors of vocational education in each of the 50 states and the District of Columbia, or a person designated by the state directors. All 51 responded. Questions were asked only about secondary vocational education.

The survey was organized around the collection of data for each of the major, individual *components* of each state's program of testing and/or assessment, not the program as whole. In a state with a well developed program of testing and assessment, these components could be, for example:

1. a state policy or guideline of requiring local programs to monitor the academic achievement of all students who complete a vocational program through the administration of a commercially available test, such as the Test of Adult Basic Skills (TABE);
2. a state policy or guideline of making a competency-based test item bank available

to local programs and strongly encouraging them to construct their own tests for measuring the vocational skill attainments of all students on completion of vocational programs; and

3. a state policy of strongly encouraging local programs to provide all students who complete vocational programs with a profile or cumulative portfolio showing their accomplishments and competencies to use in seeking employment,

Data was collected by components to be as precise as possible about the nature and extent of each state's policies of testing and assessment, and plans for the expansion or contraction of those policies through 1995. These components of testing and assessment are the basic unit of analysis of the study.

Although the data describe only the policies of states on testing and assessment, the information also appears to provide a reasonably accurate picture of policies and practices at the local level in many states. Local conformance is mandated in some states and in many others there are strong traditions of following the lead of the state agency, even if policy is not mandated.<sup>4</sup> In the remaining states, the range of local policies and practices is broad.

The survey was designed by OTA to describe all components of each state's policies and practices of testing and assessment, rather than only the components employed for implementing performance standards and measures. This provides a more accurate basis for describing practices of testing and assessment in vocational education, and examining the effects on these practices of the requirements for performance standards in the federal legislation. Testing and assessment are conducted for many reasons other than performance standards. Insofar as possible, the information collected by OTA was compared

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<sup>4</sup> Lawrence Cuban, "Enduring Resiliency. Enacting and Implementing Federal Vocational Education Legislation," *Work, Youth, and Schooling: Historical Perspectives on Vocationalism in American Education* (Stanford, CA: Stanford University Press, 1982), pp. 45-78.

item-by-item with the data on the plans of states for implementing performance standards and measures that have been collected by NCRVE.<sup>5</sup> Followup calls were made to resolve all differences. All data was obtained from the states by telephone but then sent back to them for their review and explicit approval.

For each component, questions were asked in the telephone survey and interviews to determine:

- What skills are assessed within the four broad categories of academic, vocational, generic workplace, and/or broad occupational skills.
- How information resulting from testing and assessment is used by the states.
- Where in the curriculum testing or assessment is conducted (e.g., by grade level, in introductory vocational education courses, or at the end of a sequence of occupationally specific vocational courses).
- Whether all local programs are required as a matter of state board policy or legislation to conduct testing and assessment or are only encouraged by the state to conduct it.
- What resources for testing and assessment are made available to local programs by the state as part of the state's policy on testing and assessment.
- What the state's plans are for expanding, contracting, or adding to their program of testing and assessment through 1995-96.

Practices of testing and assessment in vocational education have not previously been the subject of much research. OTA asked the obvious and most simple questions about testing and assessment practices in vocational education in

order to provide basic descriptive information and raise policy questions. The most extensive existing study is the recent NCRVE report on the implementation of performance standards. The NCRVE study lists the performance standards that have been adopted by the states and some of the measuring instruments that will be used.<sup>6</sup> A survey of state practices in competency-based testing has also occasionally been conducted by the Research and Curriculum Unit for Vocational, Technical, and Adult Education of Mississippi State University.<sup>7</sup> The most recent report describes the states that have programs of competency-based testing for vocational skills and make competency-based tests or test item banks available to their local vocational programs. The National Association of State Directors of Vocational Education has also recently completed a one-time survey of the industry skill standards initiatives of states that contains some information on assessment practices.<sup>8</sup>

#### ORIGINS OF TESTING AND ASSESSMENT POLICY IN VOCATIONAL EDUCATION

The origins and current practices of testing and assessment in secondary vocational education are different from the rest of education in several important respects. The phrase "testing and assessment" that has been repeatedly used above begins to reveal some of these differences. Roughly speaking, there are two related traditions of testing and assessment in vocational education. These two traditions have common origins in the competency-based movement. They differ in the emphasis placed on the need for written testing to provide reliable measurement, as opposed to allowing the use of a broad range of methods of

<sup>5</sup> Rahn et al., op cit., footnote 1, appendix.

<sup>6</sup> Ibid.

<sup>7</sup> National Network for Curriculum Coordination in Vocational Technical Education, Research and Curriculum Unit for Vocational, Technical, and Adult Education, Mississippi State University, "1990-91 State of the Art Report on Statewide Student Competency Testing in Vocational and Technical Education," unpublished report October 1990.

<sup>8</sup> Barbara Border, *Education-Driven Skills Standards Systems in the United States*, prepared for the U.S. Department of Education (Washington, DC: National Vocational Technical Education Foundation, October 1993).

observation and evaluation, some of which may involve a substantial amount of judgment on the part of instructors or others.

The written approach to *competency testing* in vocational education involves the administration of tests in which the questions are keyed directly to specific items of knowledge and skill needed on the job, and the answers are provided by some method of checking off the correct response from a given list of responses. In vocational education, most of these written tests are matching or multiple choice.

The range of *competency-based methods of assessment* used in vocational education is broad. Included is the administration of carefully designed performance exercises, the summary evaluation of projects undertaken by students, organized events or competitions in which students compete for recognition and rewards, and even the subjective rating of regular classroom work within some framework of performance elements, rating scales, and rating procedures. There are also longstanding practices of providing students with profiles and/or encouraging them to accumulate portfolios of their schoolwork to use in seeking employment.

For the purposes of this report, assessment is defined as a process where student responses to a task or variety of tasks over a period of time are carefully observed and evaluated or interpreted according to some set of agreed on criteria or dimensions. The tasks may be presented to the student by the teacher or a test administrator in the form of specific “prompts” or statements of problems to be solved. They could alternatively be initiated by the student in response to general instructions. Students may respond to the prompts or problem situations on demand—that is, they are assigned at a certain point in time and must be responded to within a limited period of time; or performance may occur over an extended period of time, as a part of the regular program of instruction and student work.

The differences between competency testing and assessment in vocational education parallel in some respects the current debate in academic education over the future of standardized testing and performance assessment. **There are, however, virtually no traditions in vocational education of reliance on the kinds of norm-referenced, standardized tests of academic skills that are so prevalent in academic education.** Testing in vocational education stems from entirely different origins than standardized testing in academic education. Competency testing in vocational education stems from the competency-based movement in vocational training, while standardized testing in academic education is descended from the mental testing movement that began in psychology around the turn of the century and has resulted in the concept of ability testing.<sup>9</sup>

One of the major differences between the competency-based, written testing done in vocational education and the standardized testing done in academic education is that in vocational education the tests are constructed to measure whether students have the skills needed to perform particular jobs, rather than how their performance compares with other students taking the same test. In the language of test theory, the written tests in vocational education are criterion-referenced rather than norm-referenced.

In properly conducted competency-based vocational education, both the content of the tests and the curriculum of instruction are criterion-referenced—that is, they are derived from analyses of the tasks actually performed by people working in specific occupational areas. The relationship between the job tasks identified and the content of instruction and individual test items is close.

Competency testing and assessment are a key aspect of the concept of open entry/open exit that is followed in many vocational programs. This method of organizing instruction is basic to the

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<sup>9</sup> Office of Technology Assessment, *op. cit.*, footnote 3, ch. 5.

competency-based approach, but not all programs are organized in this way. In open entry/open exit instruction, students are tested or assessed when entering programs to determine their skills. They then work to acquire the particular skills required to achieve their employment goals; they leave the program when they have demonstrated mastery of those skills, according to the results of tests or assessments. Students learning alongside each other may be learning very different skills in highly individualized programs of instruction.

The traditions of competency-based assessment in vocational education are older than competency-based testing but stem from the same origins in the competency-based movement. The specific lists of job competencies are employed as content and performance-level standards for observing and recording the capability demonstrated by students in different kinds of assessments. The content standards define the skills that students should demonstrate. There is also usually a categorized scale of performance levels that defines degrees of proficiency in performance. These performance levels are defined according to a scheme showing that the student is, for example, “skilled,” “moderately skilled,” “unskilled,” or “has not been exposed” to a particular task or sets of tasks.

The philosophy and methods of both competency testing and competency assessment are thus wholly different from the academic tradition of whole class, teacher-dominated instruction with testing at fixed points in the curriculum. Skills learned and not time spent are what drives the pace of instruction and assessment. Testing and assessment are not after the fact, external processes of inspection but integral parts of the process of education. In all of these respects, the traditions of testing and assessment in vocational education resemble what is being advocated elsewhere in the rest of education to replace

standardized testing with alternative forms of assessment.

Whether the written methods of competency testing are any more or less reliable and more or less valid than the methods of assessment used in vocational education is impossible to say merely according to differences between the methodologies themselves. The critical issue with assessment is the comparability of judgments made across instructors and from program to program. This comparability concerns both the ratings or evaluations given for similar performances and the level of performance considered sufficiently high to meet the standards. With sufficient efforts to develop consistency in rating processes through procedures of training and group judging, and to utilize available techniques for statistically checking on the consistency of ratings, high levels of consistency in raters’ judgments can be achieved in performance assessment.

With written testing, the two most critical issues are the relevance of what can be measured to capabilities for performance, and the long-run effects of closed-form testing instruments on the content and methods of instruction. Written forms of testing are generally thought to be best for measuring factual knowledge and certain forms of reasoning. The “know-how” and capabilities for more complex and extended performance that are critical in the workplace (and in life) can generally not be measured as well with written forms of testing. Written tests suffer from the fact that the knowledge and powers of reasoning that can be measured with the greatest internal consistency of individual test items, which is the necessary criterion of a sound written test, typically do not include some of the most important capabilities for occupational preparation.

The crucial point is to not assume that methods of written testing are sound simply because of their written format and that methods of assess-

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<sup>10</sup>The major source of variation in performance assessment has generally been found to be task variety rather than inconsistency in raters’ judgments. See, for example, Richard Shavelson, “Generalizability Theory and Military Performance Measurements: Individual Performance,” *Performance Assessment in the Work Place* (Washington, DC: National Academy Press, 1991), pp. 207-257.

ment are unsound simply because they involve elements of judgment in scoring performances. Much closer investigation of the consistency and relevance that are possible with different forms of testing and assessment, and how they are conducted in vocational education, is needed before conclusions can be drawn about which methods are best for what purposes.

It is important to point out that assessment in vocational education may include written testing as one of several methods of measurement employed. The emphasis in assessment is on using different methods of measurement for different kinds of knowledge and skill rather than heavily emphasizing written testing.

#### DIFFERENCES AMONG THE STATES IN POLICY ON TESTING AND ASSESSMENT

One major difference among the states is the emphasis that they place on written testing compared to assessment. Many advocates of competency-based methods of testing and assessment have encouraged the development of state resources for written competency testing for some time; certain states are much further along in the development of this capability than others. The Vocational-Technical Education Consortium of the States (V-TECS), described in chapter 4, has been one of the important results of this development.

Another important difference among the states is the extent to which local programs are required, or *mandated*, to follow the policy on testing and assessment or are only *encouraged* to follow it as a matter of state board policy, state administrative policy, or state legislation. A few states have no policy or program of testing and assessment for vocational skills but most do, and either require or encourage local programs to follow it.

Using these two dimensions of difference, the 50 states and the District of Columbia can be grouped into four different types of environments for testing and assessment:

1. *States that encourage written testing* for occupational skills in local programs, including competency-based or other forms of written testing. The encouragement of testing in most of these states is strong.
2. *States that mandate assessment* for occupational skills in local programs without specifying what methods should be used. These states typically encourage the use of multiple methods of assessment and testing in local programs.
3. *States that encourage assessment* for occupational skills in local programs without specifically encouraging one method over others. These states also typically support the use of multiple methods of assessment. The encouragement given to assessment in these states is generally not strong.
4. *States that have no specific policy or program* of encouragement or requirement for either the testing or assessment of occupational skills.

A fifth category of “mandated testing” turned out to include only two states in the 1992-93 school year so it was combined into the first category (states that encourage testing). One of these states is a small state that mandated one form of testing for occupational skills in 1992-93 and the other is New York, which has two types of statewide tests for occupational competencies.

The fact that only two states have mandatory testing shows one clear difference already between vocation education and the rest of elementary and secondary education. In academic education, most states have a large, statewide, mandatory program of testing for academic skills. For example, there were 39 states where a norm-referenced, standardized, written test of academic skills was administered statewide to all students in one or more subject areas (e.g.,

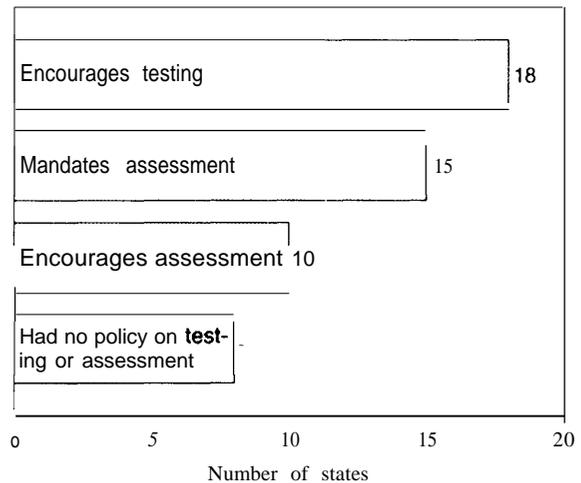
mathematics) in the 1992-93 school year.<sup>11</sup> In nearly all cases, these tests are administered at a certain grade level in those subject areas. No such mass, mandatory, statewide testing of all the students at a grade level or any other fixed point in time is conducted in vocational education. Furthermore, in many states this mass testing is administered by the state (or a contractor to the state) rather than local school districts. In vocational education, most of the testing and assessment is actually conducted or administered by staff of the local programs.

All 50 states and the District of Columbia were classified into the four categories defined above using data from the survey of states conducted by OTA. As shown in figure 3-1, 18 states are classified<sup>12</sup> as encouraging testing for occupational skills in 1992-93, 15 as mandating assessment for occupational skills, 10 as encouraging assessment of occupational skills, and 8 had effectively no policy on vocational testing or assessment.

The 18 states in the first category of encouraging testing enrolled about one-half of all high school students. The 15 states in the second category of mandating assessment enroll about one-quarter of all high school students. The last two categories each enroll about one-eighth of all high school students.

It is important to point out that the states classified as having no policy on testing or assessment for occupational skills may still have adopted performance standards and measures based on other kinds of information, such as rates of program completion or placement. Some of these states also chose to meet the performance standards requirements in the 1990 amendments by adopting a policy of allowing local programs to use their own performance standards and measures, which were then considered to be the state's performance standards and measures.

Figure 3-1: State Policies on Testing and Assessment for Occupational Skills (in 1992-93)<sup>a</sup>



<sup>a</sup> Fifty states plus the District Of Columbia.

SOURCE: Office of Technology Assessment, 1993.

## STATE RESOURCES FOR TESTING AND ASSESSMENT

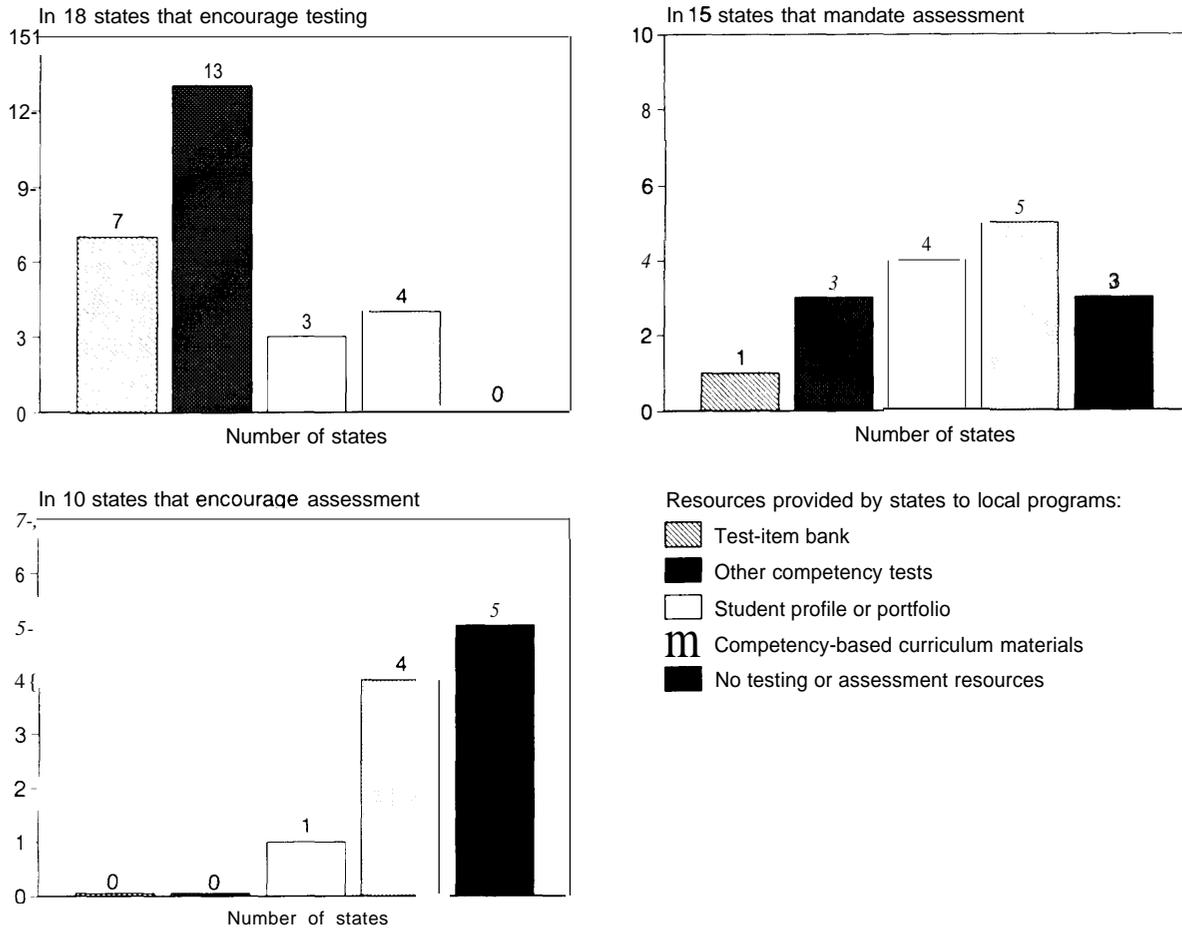
States encouraging testing for occupational competencies differ substantially in the extent of encouragement they provide, but there is no way of distinguishing among them using the data collected in the OTA survey. At one extreme are states like Oklahoma, where substantial investments have been made in competency testing and assessment in over 100 job-specific areas over a number of years. Oklahoma even has its own test development center, the Oklahoma Occupational Testing Center (OOTC). The state makes three kinds of instruments available to local programs:

1. tests for measuring the gains in the specific occupational competencies taught in specific courses,
2. tests for measuring the levels of competency achieved by students who complete sequences of courses, and

<sup>11</sup>North Central Regional Education Laboratory, *State Student Assessment Program Database, 1992-93* (Oak Brook, IL: Regional Policy Information Center, September 1993), table 3.7, p. 141.

<sup>12</sup>States are classified on the basis of their major component of testing and assessment for occupational skills.

**Figure 3-2: State Resources for Testing or Assessment of Occupational Skills (in 1992-93)**



SOURCE: Office of Technology Assessment, 1993.

3. profiles displaying those competencies that are given to students when leaving local programs to use in seeking employment.

At the other extreme is a state that only makes a single, state-developed test of 'core occupational content' available to local districts to use as they wish.

Further differences among the four types of states can be illustrated by showing the kinds of resources for testing and assessment they provide or strongly recommend to local vocational programs. As shown in figure 3-2, four types of resources are provided:

1. *Competency test item banks.* Using these test item banks, local programs construct or write their own criterion-referenced competency tests reflecting the specific needs of their own programs of instruction.
2. *Other forms of competency tests.* These may be developed by the states themselves, purchased from vendors such as the National Occupational Competency Testing Institute, or obtained from industry groups for use in certifying students for particular jobs.
3. *Student profiles or portfolios.* These resources are used to provide students with a

means of reflecting on their own progress and communicating their accomplishments when seeking employment, further education, or for other purposes.

4. *Competency-based curriculum* materials. These materials frequently include testing instruments, assessment ideas, assessments, written testing, and/or checklists of competencies that are suitable for purposes of both teaching and conducting assessments.<sup>13</sup>

As indicated in figure 3-2, all 18 of the states that “encourage testing” either recommend the use of, or make available to local programs, a competency-based testing instrument or test item bank. Some of these states also provide the other two types of resources for assessment, but not nearly to the same extent as states that mandate assessment or encourage assessment. On the other hand, only four of the states that mandate assessment make resources for competency-based testing available to local programs. These states apparently do so without specifically encouraging the use of testing over alternative forms of assessment. Both the states that encourage testing and those with mandatory assessment tend to place a strong emphasis on competency-based vocational instruction and embed assessment in the instructional process. These two types of states differ, however, in the extent to which they stress the need for written methods of testing, as opposed to more qualitative methods of assessment. In the states with mandatory assessment, local programs are required to conduct some form of assessment, but may use methods that best suit the philosophy and needs of their program.

The extent to which local programs are competency based differs among the four types of states. As shown in figure 3-3, states that mandate assessment tend to report higher percentages of competency-based programs than do states that

encourage assessment or even those that encourage testing. This is true even among the subset of nine states where extensive test item banks for competency-based instruction have been developed. It may be that competency testing is being used in these states as a mechanism for forcing local programs to employ competency-based instruction and it is not working as well as the methods that are being used in states that are mandating assessment.

In fact, states with no policy of testing or assessment for occupational skills appear to have nearly the same incidence of competency-based instruction as states that encourage testing. This fourth group of states includes about equal numbers of very small states with no policy on testing or assessment for occupational skills, and larger ones where significant statewide educational reforms are under way that involve vocational education. (The number of states in the fourth category is very small, so that the apparent similarity with the first category may not be significant.)

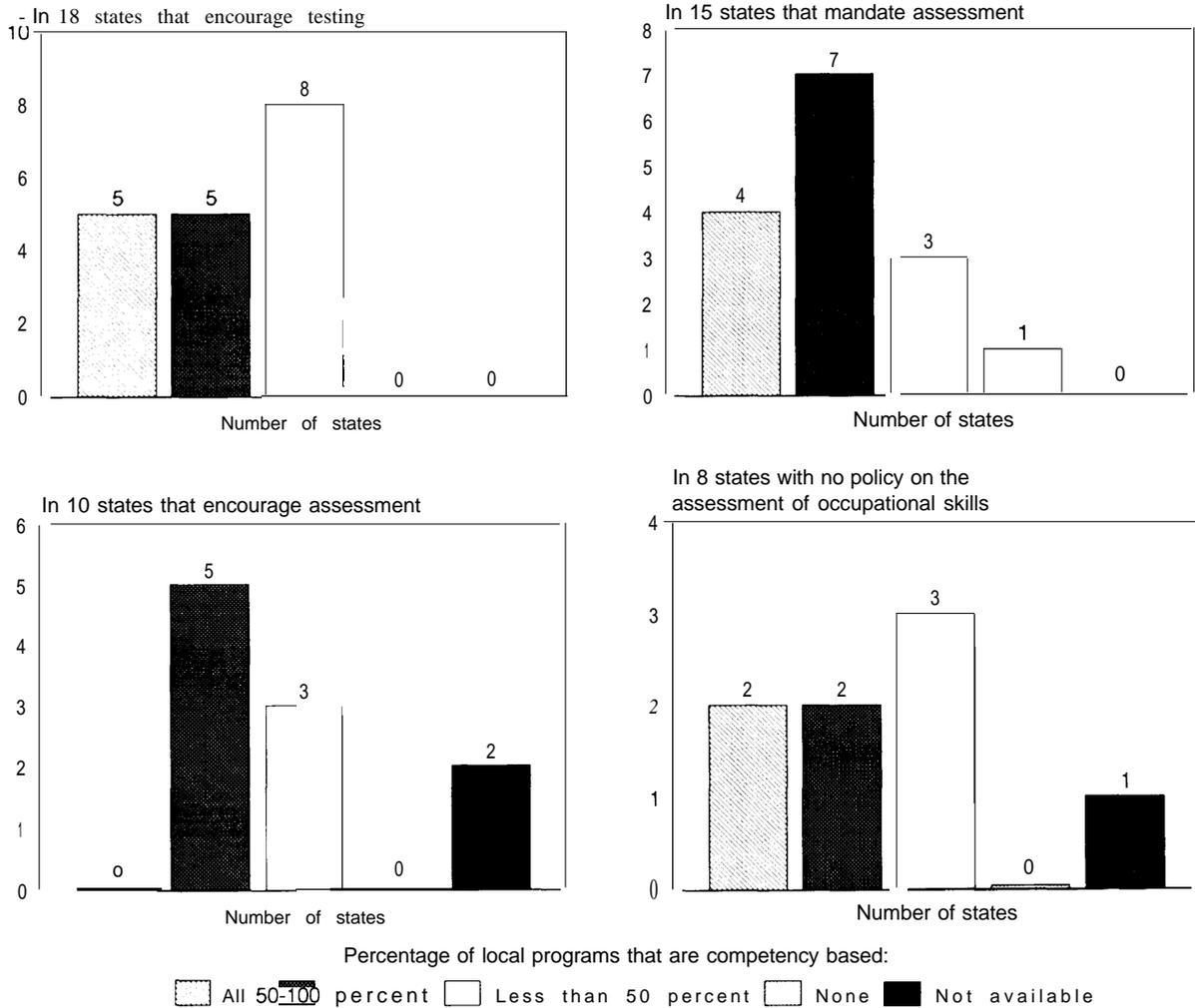
## WHAT SKILLS ARE ASSESSED?

One of the most important aspects of the 1990 amendments is the substantive priorities for the reform of vocational education. Chief among these reforms is the integration of academic and vocational education, or combining the teaching of academic and vocational skills in the school curriculum. A second reform in the legislation is to broaden the occupational skills around which vocational programs are organized. This priority, which will be called organizing vocational education around *broad technical skills*, is less well developed in the legislation than the priority on integrating academic and vocational education, but is evident in the language of “applied technology” and teaching “all aspects of industry” in vocational programs that appears in the

<sup>13</sup> Because of the way that the questions were asked in the OTA survey, the data in figure 3-2 represent the main resources provided to local programs rather than all of the resources provided.

<sup>14</sup> The testing items in figure 3-2 include “Test-Item Banks” and “\*Other Competency Tests.”

Figure 3-3: Use of Competency-Based Curricula in Local Programs (in 1992-93)



SOURCE: Office of Technology Assessment, 1993.

1990 amendments. It is also evident in the request from Congress for information from OTA about the availability of instruments for assessing the broad technical skills of vocational students. A third kind of reform that has been recommended by various outside commissions and studies is that preparation for work in vocational education and all kinds of training programs should be

organized around the development of what in this report are called *generic workplace competencies* or skills.

A major new development is the plan to create a National Skill Standards Board in the Goals 2000: Educate America legislation currently being considered by Congress. This calls for broadening the technical skills taught in vocational and other

<sup>15</sup>Anthony Carnevale et al. *Workplace Basics* (San Francisco, CA: Jossey Bass, 1990); and Secretary's Commission on Achieving Necessary Skills, *What Work Requires of Schools* (Washington, DC: U.S. Government Printing office, June 1991).

kinds of work-related education and training programs. The board would do this by defining the skills required by industry in “broad occupational areas” of the economy and supporting the development of a national system for certifying the competence of individuals in those areas. The goals reflect recommendations that have been made by a number of outside commissions and studies.<sup>16</sup>

These proposals for the reform of vocational education (and other forms of skill training and education) provide a skills framework for describing the kinds of change that are occurring in the testing and assessment programs of states. Change in the types of skills being tested for or assessed by the states provides some indication of their priorities for the reform. The four types of skills are:

1. **Vocational skills**, which consist primarily of job-specific skills determined through job analysis and other tools of competency-based vocational education.
2. **Academic skills**, which, among the state vocational testing and assessment programs surveyed, are primarily reading, writing, and mathematics.
3. **Generic workplace skills**, which are of two types: a) *employability skills*, such as work attitudes and knowledge of how to find a job; and b) *workplace competencies*, such as ability to work in teams, communicate information, solve problems, and manage resources.
4. **Broad technical skills**, which are the core skills and understandings of technology, information, and organization, and even history, needed to perform effectively within a range of occupations in an industry, such as manufacturing, finance, or hospitality.

The first, third, and fourth of these types of skills together (vocational skills, generic workplace skills, and broad technical skills) will be called *occupational skills*.

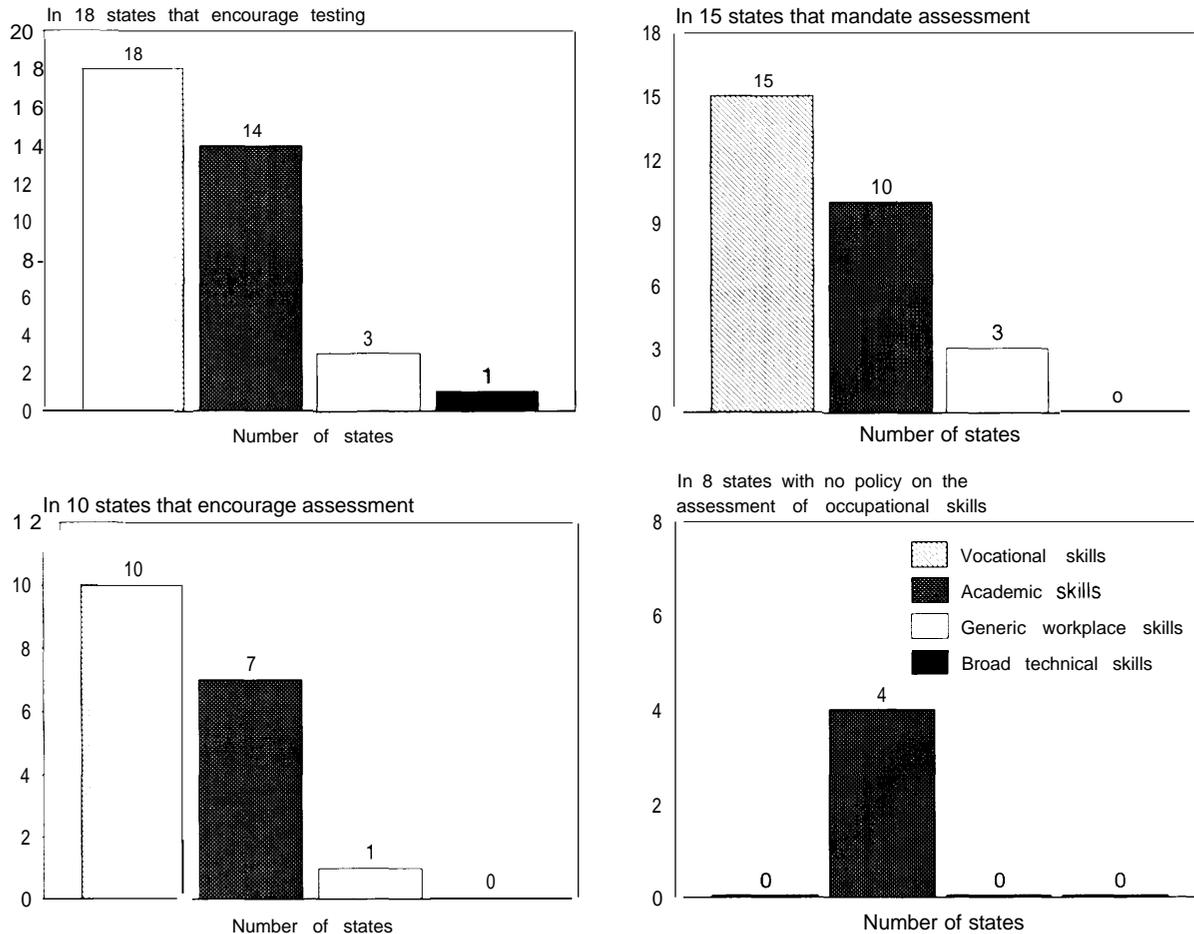
The number of states with a component of testing and assessment for each of these four types of skills is shown in figure 3-4. The percentages of states having at least one component of testing or assessment are very similar for each type of skill—that is, the percentage of all states in the first category that test for or assess academic skills is about the same as the percentage of states in the second and third categories of states that test or assess for academic skills, and so forth. All 43 states in the first three categories of states have at least one component of testing or assessment for vocational skills. In the first three categories, 31 states have at least one component of testing or assessment for academic skills. Seven states in the first three categories have components of testing or assessment for generic workplace skills. Only one state in the first three categories supports testing for broad technical skills. In states with no policy of testing or assessment for occupational skills (the fourth category), only academic skills are assessed.

It is important to point out that the 1992-93 school year was actually the first year in which states were expected to operate their new performance standards under the 1990 amendments to the Perkins Act. This affects mainly the number of states with a component of testing or assessment for academic skills in subsequent years. If the baseline year of the OTA survey had been 1 year earlier, the number of states conducting testing or assessment for academic skills would in all likelihood have been much smaller than the 31 found in 1992-93, while the number conducting testing or assessment for vocational skills would

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<sup>16</sup> Commission on the Skills of the American Workforce, *High Skills or Low Wages!* (Rochester, NY: National Center on Education and the Economy, 1991); and Gene Bottoms, *Redesigning and Refocusing High School Vocational Studies* (Atlanta, GA: Southern Regional Education Board, 1993).

Figure 3-4: Skills Included in Current State Policies on Testing and Assessment (in 1992-93)



SOURCE: Office of Technology Assessment, 1993.

have been about the same as shown in figure 3-4.<sup>17</sup> The reason is simply that most states essentially employed their existing policies of testing or assessment for vocational skills in implementing performance standards. Many fewer

states initially had any capabilities in place for testing or assessing academic skills.<sup>18</sup> This indicates a substantial response by the states to the requirements of the 1990 amendments for performance standards.

<sup>17</sup>In a 1991 survey, the National Center for Research in Vocational Education found that 24 percent of states had previously used specific performance standards and measures for academic skills at some time in the past. EGareth Hoachlander, *Performance Measures and Standards for Vocational Education: 1991 Survey Results*, MDS-388 (Berkeley, CA: National Center for Research in Vocational Education, January 1992), figure 1.

<sup>18</sup>The number of states with a statewide academic testing program is large but the number of state vocational education agencies that were regularly obtaining data from those programs for vocational students was undoubtedly small.

### WHERE IN THE CURRICULUM ARE THE SKILLS ASSESSED?

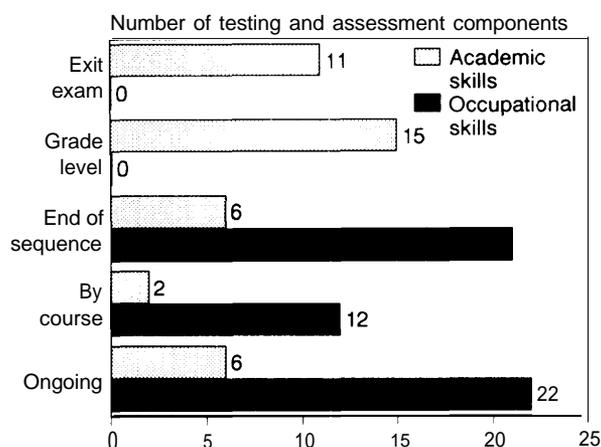
A second way of describing the testing and assessment policies of states is to ask where in the school curriculum the different types of skills are assessed and for what reasons. The answers shed some light on relationships between performance standards and reform.

The survey data collected by OTA show that the testing and assessment for academic skills included in state programs is highly separated from the testing and assessment for occupational skills. This separation appears to be undercutting the priority in the legislation on integrating academic and vocational education. The separation occurs because of major differences in the methods of testing and assessment being used for measuring academic and vocational skills.

As indicated in figure 3-5, most states have chosen to measure the academic skills of vocational students through obtaining test results from either their statewide academic testing program or their statewide minimum competency exit examination. Twenty-six of the 40 components of testing or assessment for academic skills in 1992-93 used these measures. These 26 components cover 25 of the 35 states where academic skills were measured in 1992-93, or 71 percent of all states. Fifteen of these 26 components use results from the regular statewide program of academic testing or assessment, and 11 use the minimum competency exit exam. The remaining 14 of the 40 components of testing or assessment for academic skills are much more closely tailored to students' patterns of enrollment in vocational and academic programs.

The problem with relying on exit exams and statewide academic tests is that they are administered centrally without any relation to when students enroll in vocational education, while testing and assessment for occupational skills is done locally and is closely tied to individual courses or the completion of vocational and academic courses.

**Figure 3-5: Location of Testing and Assessment in the Secondary School Curriculum (in 1992-93)**



NOTE: occupational skills include vocational, generic workplace, and broad technical skills.

SOURCE: Office of Technology Assessment, 1993.

Furthermore, the bulk of this academic testing occurs in the 9th, 10th, and 11th grades, although some of the academic testing occurs in the 12th grade. (Some of it actually occurs as early as the 8th grade.) Minimum competency exit exams are taken for the first time in most states in the 9th or 10th grade and students keep taking them until they pass in order to graduate with a diploma.

In contrast, very little of the testing and assessment for vocational skills among the total of 55 components of testing and assessment for occupational skills shown in figure 3-5 occurs in the 9th or 10th grades. Most of the testing and assessment is conducted in the more advanced occupationally specific coursework that students typically take in the 11th and 12th grades. Only 6 of the 55 components shown cover vocational courses at the general introductory level, which are typically taken by students in the 9th or 10th grades. The remaining 50 components are for occupationally specific vocational education.

Another difference between academic and occupational approaches is that vocational skills measurement is much more closely related to specific courses and sequences of courses in the

vocational curriculum than is academic testing. As shown in table 3-1, in the states that encourage testing for vocational skills, the most frequent place in the curriculum for testing and assessment is at the end of a sequence of occupationally specific courses. This is the case by a substantial margin over all of the other possibilities in percentage terms. The second-most frequent pattern is to test or assess for skills in relation to specific vocational courses. These two uses of tests and assessment appear to reflect the close relationship between testing and competency-based vocational instruction that exists in states with strong policies of testing or assessment for vocational skills. The purpose of the testing and assessment at the end of a sequence of courses is generally to determine what students have learned.

The third basic pattern is ongoing testing and assessment for vocational skills, which means that local programs are encouraged to conduct testing and assessment as an integral part of instruction, with perhaps summative assessments or other forms of evaluation at certain points, without any specific guidelines on when the assessment should take place or for what specific purposes. Especially in the states with policies of mandatory assessment, this ongoing assessment is typically done within a framework of competency-based vocational education. The emphasis in these states is on encouraging local programs to consider multiple approaches to assessment and to develop their own programs.

The policies of testing and assessment for academic skills in these same (mandatory assessment) states are similarly ongoing, as shown in table 3-1. Few of these states have formal statewide testing programs like the states that are obtaining information about academic skills by grade level or from a minimum competency exit exam. How frequently local programs in these states are finding ways of linking academic and vocational assessment in their ongoing programs of testing and assessment is impossible to tell from the data OTA collected.

The potential for assessing academic and vocational skills together is much greater in the states where the policies of testing and assessment for both academic and vocational skills are highly localized than in states where the data are being obtained from a centralized, statewide academic testing program. *None* of the states in the two categories of “mandatory assessment” and “encourage assessment,” where most of the ongoing testing and assessment occurs, indicated that a priority has been placed on the integration of academic and vocational skills in the practices of testing and assessment. They maybe doing this but it is not possible to tell from the OTA survey.

There are only 14 components in 12 states where close course-level connections are apparently being drawn between academic and occupational skills assessment. These are shown in the top portion of columns three, four, and five of table 3-1. There are three basic patterns of test policy and use among these components. One is that a commercially available academic test, like the Test of Adult Basic Skills, is being directly administered to vocational students as they enter or complete specific vocational courses or sequences of courses. Gain scores are obtained in a few of these cases by correlating test scores from program or course completion with scores on the same test taken at an earlier point in the student’s studies. This takes a substantial degree of coordination. The second pattern is states where academic skills have been incorporated into the lists of occupational competencies around which testing or assessment for occupational skills is being conducted. There is only one state (Oklahoma) where a sufficient priority has been accorded to this strategy to have indicated it on the questionnaire. However, pilot projects to accomplish this same strategy are currently under way in several other states. The third pattern is states where tests for academic skills that are contextualized to specific occupational areas have been developed. Arizona’s Academic Test Item Bank (ATIB) is the clearest example of this. The ATIB is a

**Table 3-1: Location of Testing and Assessment for Vocational and Academic Skills in the Secondary School Curriculum in 1992-93**  
(total number of testing or assessment components by type of state)

Type of skills and state	Location in the curriculum				
	Minimum competency exam	By grade level	Sequence of vocational courses	By vocational course	Ongoing
<b>Academic skills:</b>					
Testing encouraged . . . . .	4	6	3	2	1
Mandatory assessment . . .	2	5	1	0	3
Assessment encouraged . . .	3	2	1	0	2
No current policy . . . . .	2	2	1	0	0
Total . . . . .	11	15	6	2	6
<b>Occupational skills:</b>					
Testing encouraged . . . . .	0	0	14	9	4
Mandatory assessment . . .	0	0	6	2	10
Assessment encouraged . . .	0	0	1	1	8
No current policy . . . . .	0	0	0	0	0
Total . . . . .	0	0	21	12	22

NOTE: The total numbers of components for academic and occupational skills are 40 and 55, respectively.

SOURCE: Office of Technology Assessment, 1993.

resource bank of written test items for academic skills that are criterion-referenced to occupational skills and set in vocational problem situations.

Problems of integrating academic and vocational skills testing and assessment will be difficult to overcome in states that rely on test scores from their large-scale, statewide standardized testing programs for the assessment of academic skills. One problem with using this statewide data is that the *grade levels* where academic test score information is being collected are different from the grade levels where testing and assessment for occupational skills is being conducted. The fact that most of the academic testing is done before students take most of their vocational education suggests that academic testing could turn out to be used primarily as a screen for entrance into vocational programs, or as a prod to students' teachers in earlier grades, rather than as a means of verifying the academic skill attainments of vocational students when they leave their vocational programs or for actually improving the integration of academic and vocational learning.

There will also be difficult logistical problems in matching the statewide test data with the highly

localized vocational testing and assessment on a student-by-student basis. Merging or comparing **pre-** and **post-**test score data for the same student from these two sources and relating any gains or losses observed to the very complex patterns of local enrollment in vocational courses and programs will be extremely difficult. The most likely use of the centralized academic data will be in coming to broad conclusions about the general levels of academic performance of students in vocational programs compared to other parts of the school curriculum. Whether the higher or lower scores of the vocational students are due to the vocational curriculum, the success or lack thereof in integrating academic and vocational instruction, or processes within schools of channeling students into different curriculum areas in the first place will be impossible to determine. The best solutions to these kinds of problems are likely to lie in the decentralizing of testing and assessment for academic skills to local programs and embedding it in instruction. The challenge will be to find a way of doing this while maintaining a sufficient degree of comparability across programs.

Why most of the states have chosen to import test data from their large-scale, statewide academic testing programs is reasonably clear. The data provide the simplest and cheapest means of complying with the requirements for standards and measures of performance “including academic skills” in the 1990 amendments. All other solutions are complicated and more difficult to implement.

### WHY ARE THE SKILLS ASSESSED?

Another issue is how states are using information from their programs of testing and assessment to meet performance standards requirements. These could include using the results in making decisions at the state and local levels about the improvement of schools or programs, diagnosing student learning and modifying instruction at the classroom level on a regular basis, monitoring student attainment of skills in courses or programs, and certifying students’ capabilities. For performance standards, the issue is whether the information is actually being used to make decisions about programs, and not just being collected in order to comply with the requirements.

The purpose of the performance standards is to make decisions about local programs, but it is possible to simply collect information about local programs and compute whether they are meeting the standards without doing anything with the results. In the OTA survey, the state respondents were asked to indicate all of the purposes for which each of the separate components of their testing and assessment programs were being used at the state and local levels. For each component of their program of testing and assessment, state respondents were asked to check off on the questionnaire which of the following uses were being made of the information:

- To satisfy requirements for accountability, *not including* accountability or performance standards under the Perkins Act.

- To satisfy requirements for accountability *including* accountability or performance standards under the Perkins Act.
- To make decisions about the improvement of programs, courses, or schools at the state or local levels.
- To assess students for program or course completion, certification, or progress in learning.

Respondents were instructed to check all uses that occur at the state and local levels with some frequency. They checked an average of 2.07 uses per testing and assessment component for vocational skills and 1.98 uses per component for academic skills.

One important finding from this question is that the patterns of use are opposite for academic and occupational skills. For academic skills, the most frequent use of information resulting from testing and assessment at the state and local levels is compliance with the requirements of the 1990 amendments. The most frequent use of information about occupational skills is monitoring the skill attainments of individual students or certifying student accomplishments. This information also informs teachers on the effectiveness of instruction.

The second main finding is that the least likely use of the information for both academic and occupational skills is making decisions about the improvement of programs, schools, or courses. This is potentially a problem since performance standards are supposed to be used in reviewing the effectiveness of local programs.

Further indication of the seriousness of the problem is the very low frequency with which information from testing and assessment is being used at the state and local level for reasons of accountability other than meeting the Perkins requirements. Information from testing or assessment is apparently not a very important basis for accountability at the state and local levels. This means that the test-based forms of accountability in the 1990 amendments are substantially differ-

ent from whatever the principal mechanisms of accountability currently are. Using information from testing or assessment for purposes of accountability and making decisions about the improvement of programs will be relatively new for most states.

States do have considerable experience in collecting data on rates of program completion or **followup** rates of employment and earnings. Whether this information is merely collected or actually used for purposes of improving programs or making decisions about them is the important question.

There are several possible reasons for the low rates at which information from testing and assessment is being used for program improvement. One is that states were not required under the legislation to link their performance standards with the review of local programs until the 1993-94 school year. Perhaps this year the frequency with which information from testing and assessment is used for program improvement will increase substantially. Another reason may be that states simply do not have enough experience yet to know precisely how information from testing and assessment can be used for making decisions about programs.

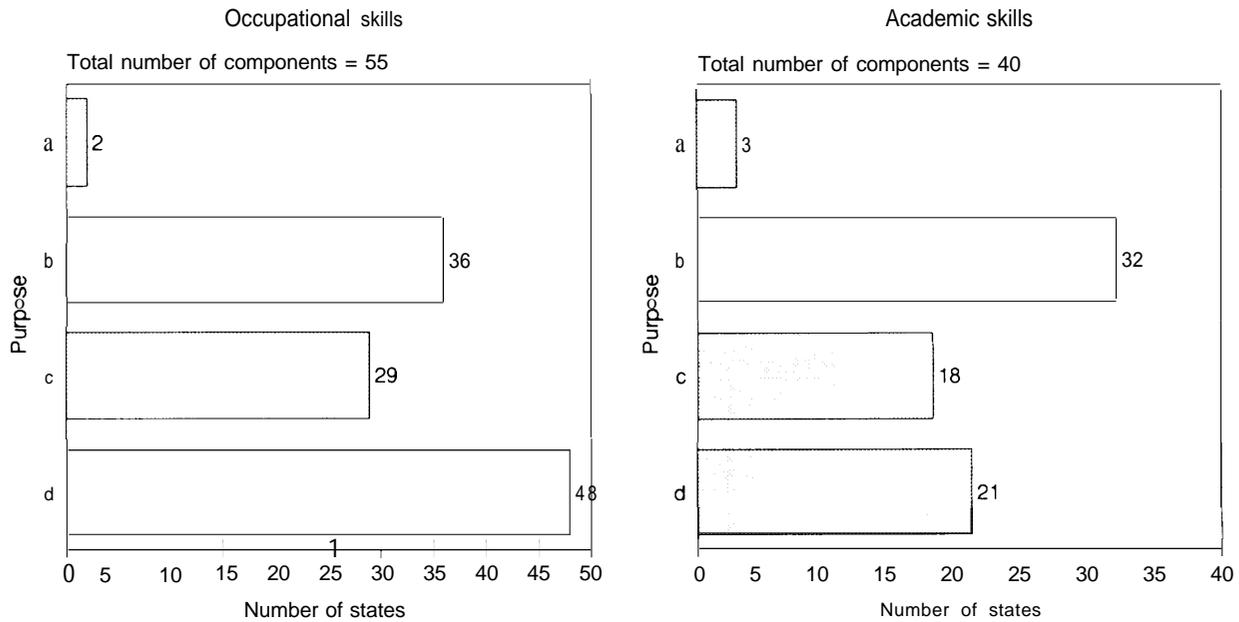
However, it may also be that the testing and assessment information simply turn out not to be very useful for making decisions about programs. The issues in appropriately using information from testing and assessment for making **high-stakes** decisions about programs are complex and difficult. Data are easy to come by. Information that really means something and measures accurately the outcomes of programs is much more difficult to obtain. Accurate information is even more difficult to obtain when the consequences of providing it to a state authority may be untoward. The examples given in the previous section about coordinating academic and occupational test information from different sources indicate how complicated and difficult the careful use of information from testing and assessment will be in many cases.

It is crucially important to recognize that the data presented in figure 3-6 can only be interpreted qualitatively because of the way that questions were asked in the OTA survey. For example, the data cannot be interpreted to say that information from testing and assessment for occupational skills is used “x” percent more often for working with students than is **information** about the academic skills of students. The only comparison that can be made from the data presented in figure 3-6 is that testing and assessment are used more frequently for some purposes than others, as discussed above, within the two categories of skills. In order to measure use in absolute terms, scales for recording perceptions of the importance of different uses of information from testing and assessment and combining them would have to be developed.

The data were checked to see if the basic profile shown in figure 3-6 differs among the four types of states. It does not. All four groups of states have basically the same profile.

Some differences exist in how information about occupational skills is used depending on where in the curriculum it is generated. As shown in table 3-2, the frequency of different uses is about the same for all three ways in which testing or assessment information is generated in the curriculum (at the end of sequences of courses, by course, or through ongoing assessment). The main exception to this is that information from ongoing assessment is significantly more likely to be used for purposes of student assessment than the information generated through the other two modes. Basically, the ongoing form of testing and assessment appears to be more student oriented than the two other forms of assessment. As will be shown in the next section, ongoing testing and assessment also involves less use of tests and more use of assessments than testing and assessment that is related to courses or sequences of courses. In short, testing appears to be oriented to accountability and assessment to student learning.

**Figure 3-6: Purposes of Testing and Assessment in 1992-93**



KEY a = Used for accountability, not including Perkins  
 b = Used for accountability, including Perkins  
 c = Used for program, course, or school improvement  
 d = Used for the assessment of students for program or course completion, certification, or monitoring of learning progress

SOURCE: Office of Technology Assessment, 1993.

**WHAT FORM OF MEASUREMENT IS USED?**

The extent of reliance on written forms of testing as opposed to assessment differs greatly among the states, as shown in figure 3-7. Nearly all of the testing and assessment for academic skills encouraged or required by the states is done using standardized, written tests; only 7 out of the 40 components of testing or assessment for academic skills involve the use of instruments or methods other than standardized tests. In most of these cases, the standardized tests are developed by the states themselves, although some are commercially developed. The seven components of testing or assessment for academic skills are wide ranging. In Arizona, the vocational program will use results from the assessments for academic skills that each local school district is required to conduct under state policy. Some of these districts employ various forms of perform-

ance assessment, while others rely on written tests. Arizona has an item bank for assessing academic skills in the context of vocational skills. The vocational program in California will use results from their large, new, statewide system of performance assessment in the subject areas of reading, writing, mathematics, science, social studies, and history. In the four other states using assessment for academic skills, the state has turned directly to their local vocational program and expects them to develop means of conducting assessments for academic skills.

For occupational skills, the differences among the states are much greater. As shown in figure 3-7, the proportion of components that involve written testing is much higher in the 18 states that encourage testing for occupational skills than in the states that mandate or encourage assessment. In fact, 20 of the total of 25 existing components of testing or assessment for occupational skills in

**Table 3-2: How the Results From Testing and Assessment for Occupational Skills are Used Depending on Where in the Curriculum They are Conducted (total number of uses)**

Location of the testing or assessment in the vocational curriculum	Uses of the resulting testing and assessment information about occupational skills			
	For accountability purposes, not including Perkins	For accountability purposes including Perkins	For program, school, or course improvement	For student assessment and/or certification
At the end of sequences of vocational courses . . . . .	1	15	12	16
During and/or at the end of individual courses . . . . .	1	8	7	10
Ongoing in the vocational curriculum . . . . .	0	13	10	22
Total . . . . .	2	36	29	48

SOURCE: Office of Technology Assessment, 1993.

these 18 states involve written testing and only 5 others involve assessment. Conversely, only 3 of the total of 27 components in states that encourage or mandate assessment involve some form of written testing. The other 24 components involve some form of assessment. Generally, the model of assessment in these states is:

1. sets of core occupational **competencies** covering as many as 50 or more occupationally specific job areas are adopted by the state;
2. local programs are either encouraged or required to utilize these sets of **competencies** in organizing instruction and conducting assessments;
3. local programs are also typically encouraged or required to provide students with a profile of their **competencies** using the same competency frameworks; and
4. assessment tied to specific courses, program completion, or ongoing assessment is strongly encouraged or required.

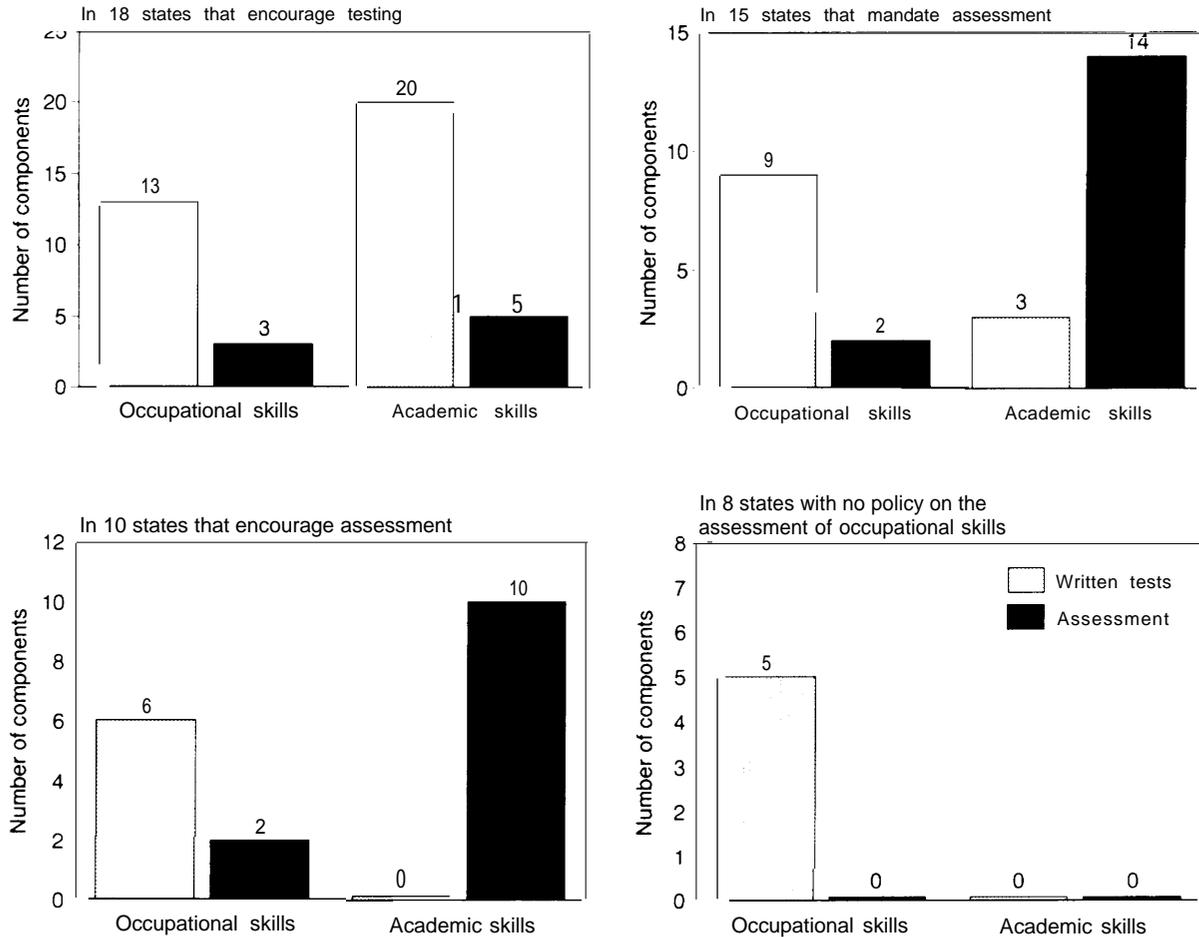
Especially in states that mandate assessment, local programs are furthermore required to:

5. submit evidence to the state confirming that the required assessments have been conducted and describing how they were conducted.

In the information about state programs that OTA obtained, only one state volunteered that local programs are annually reviewed using information from testing and assessment. (However, OTA did not specifically ask this question.)

While the information in figure 3-7 and data reported above distinguish sharply between written testing and assessment, it needs to be underscored that the line of separation between the two is blurred. Even in states where competency testing for occupational skills is encouraged, the main component of testing for occupational skills typically includes elements of both testing and assessment. This is also true for the major vendors of occupational tests, as described in the next chapter. In short, the components of “testing” that are shown in figure 3-7 frequently include some elements of assessment. Furthermore, states that encourage testing in their main component of measurement for occupational skills may also have other components primarily oriented to assessment. One example of this would be several states with both a policy of encouraging competency testing in their main component of testing or assessment for occupational skills, and providing students with profiles or portfolios. In fact, in vocational education there tends to be a substantial emphasis in most states on using multiple forms of assessment.

**Figure 3-7: Methods of Testing and Assessment Employed by the States (in 1992-93)**



SOURCE: Off Ice of Technology Assessment, 1993.

The experience in most states where written forms of testing for occupational skills is encouraged is that the written tests end up being used to a greater extent than methods of assessment in measuring occupational skills. Once started, their use frequently tends to grow disproportionately compared to assessment. Even V-TECS, which is one of the key organizations involved in developing competency-based testing for vocational education, has performance items for only two-thirds of the 35 item banks where both competency lists

and testing items are available, and the performance items comprise only a small proportion of each item bank.

### HOW ARE PRACTICES OF TESTING AND ASSESSMENT CHANGING?

The next question is how testing and assessment in vocational education are changing in response to the 1990 amendments. The most likely direction of change is that the performance

<sup>19</sup> Brenda Hattaway, assistant director, V-TECS, personal communication, Sept. 30, 1993.

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standards that states have adopted will require expansion of testing and assessment.

OTA asked the states to describe their plans for the expansion, contraction, or continuation of their existing components of written testing and assessment for both academic and occupational skills over the 3 years between 1992-93 and 1995-96, and what new components of written testing or assessment for academic and occupational skills will be added. Questions were asked in some detail about changes in the skills to be assessed, the populations and programs to be tested or measured, and even the extent to which their plans for expansion are responding to the requirements for performance standards in the Perkins amendments. Questions were structured to determine if the plans are definite or are only being considered. Most states responded that their plans for expansion are definite.

The results show that a substantial increase in testing and assessment will occur in vocational education by 1995-96 (see figure 3-8). Most of the increase will occur in the expansion of existing components of testing and assessment rather than the creation of new ones, but some new components will also be added. In 1992-93, there were a total of 92 components of testing and assessment for academic and occupational skills among the states. Of those existing components, 48 are slated for expansion by 1995 and 20 new ones will be added for a total of 109 components by 1995.<sup>20</sup> The remaining 41 components will stay the same or nearly same through 1995.

States indicated in their questionnaire responses that the requirements of the Perkins Act for performance standards have been an important if not the deciding factor in over 80 percent of all these planned expansions of testing and assessment for occupational skills and over 70 percent of the planned expansions for academic skills.

States' plans for the expansion of their policies of testing and assessment through 1995 cover a wide range. Some states are planning only minor additions or modifications to existing programs. Others involve the implementation of comprehensive new systems.

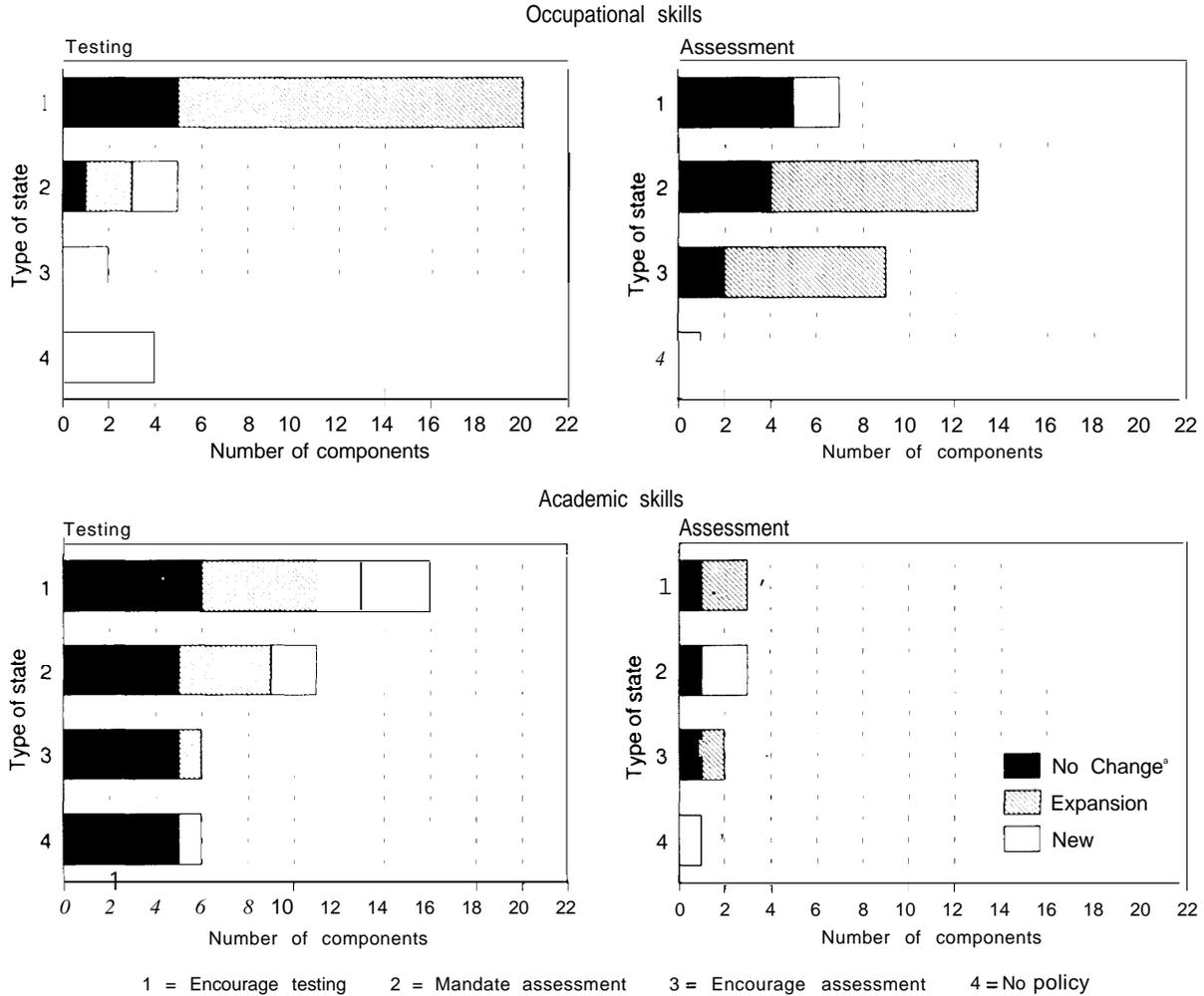
Ohio, for example, will implement an ambitious expansion of their 28-year-old Ohio Vocational Competency Assessment Program to include: a) three subtests from the new Work Keys system, which were being piloted in the state during 1992-93 (Work Keys is described in chapter 4); b) new or revised competency tests for both occupationally specific and employability skills in over **60 occupational areas**; c) and a shift in policy from simply making competency tests available to local programs to strongly encouraging their use in local programs. In effect, a comprehensive statewide system of competency testing for vocational and generic workplace skills is being implemented. Ohio will also continue its longstanding statewide program of performance competitions for students.

Texas plans to add student portfolios to their currently required profiles of student competencies and to launch a new performance-based assessment program for generic workplace competencies. South Carolina plans to expand the number of occupational areas where test banks are available beyond the 41 areas where they are currently in use. Iowa plans to stiffen their requirements for assessing student competencies in local programs. West Virginia plans to add student profiles to their competency testing program in the 1993-94 school year and make the requirement mandatory for local programs. Kansas will incorporate generic workplace skills into their profiles of student competencies after piloting them this year. At the other end of the spectrum, there are several states where the only plans for expansion are to increase the number of

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<sup>20</sup>Three of these new components will be existing components that change from assessment to testing. These three components are classified as "new" in figures 3-8 and 3-9. This explains why the 20 new components added to the 92 components that existed in 1992-93 increases the total number of components in 1995-96 to only 109. Two of these three "new" components are occupational and one is academic.

Figure 3-8: Planned Expansion of Testing v. Assessment by 1995-96



a One of these components will contract.

SOURCE: Office of Technology Assessment, 1993.

occupational or job areas covered in their existing program.

The most significant shift that will occur in the near future is from assessment for occupational skills to written testing. There will be eight new components of written testing for occupational skills among the states and three new components of assessment. However, two of the existing components of assessment for occupational skills will disappear for a net gain of only one new

component of assessment. All eight of these new components of written testing will be in states that are currently in the category of either mandating or encouraging assessment, or do not have a policy on testing and assessment for occupational skills.

This means that the number of states in the category of encouraging testing for occupational skills will increase from 18 to 26. Those in the other three categories of mandating or encourag-

ing assessment, or not having a policy on testing and assessment, will decline from 33 states to 25 states.

Three-quarters of the existing components of written testing in states that encourage testing for occupational skills are also slated for expansion, compared to just over 50 percent of the existing components of assessment (17 of 23 components of testing compared to 16 of 29 existing components of assessment).<sup>21</sup>

The net effect of all these changes will be to shift the balance between testing and assessment in state policy from 23 components of testing for occupational skills and 29 for assessment in 1992-93 to 31 components of testing and 30 of assessment by 1995.

The major issue is what the long-term effects of this shift toward written methods of testing are likely to be on the character and content of vocational education. Programs of vocational education and training seem to be one of the last places where written testing should be preferred over methods of performance assessment. For example, methods of work sample testing have consistently been found to be more directly related to competence on the job than competency testing.<sup>22</sup> The long-term effects of written testing could be to shift teaching and learning in vocational education away from the development of more complex skills toward a greater emphasis on acquiring factual knowledge of various kinds, and away from constructive forms of student learning toward teacher-dominated modes of instruction. The effects on the character of vocational education could be profound.

There are several factors driving this shift toward increased written testing. One is the lower

cost of written testing compared to performance assessment in time, materials, and instructor effort. This tends to produce strong incentives for the growth of written testing and the decline of assessment. Another is the widespread perception that written testing is more reliable and fair than methods of assessment where the judgments of instructors or evaluators are generally involved. In fact, with sufficient training and moderation of judgments, differences in rating among raters presents no problem.<sup>23</sup> The third is that the kinds of factual knowledge and information that are most readily tested tend to favor lecture methods of instruction over active methods of learning and hands-on laboratory and field work. This will tend to drive instruction in vocational education toward teacher lecturing and away from hands-on learning. For example, factual information about building codes and handbook information about the sizes and strengths of materials is much easier to incorporate into a written test and easier to teach with lecture methods than are concepts of designing and installing an electrical system for a house. Both are important but the issue is the balance between the two.

Unfortunately, there is very little good research on the long-term effects of written testing compared to assessment on the character and content of instruction in active learning environments like vocational education, so firm conclusions on this issue cannot be drawn. One of the best known studies is an article on training in the military, which gives one example of the dramatic effects that can occur. In the example, the substitution of performance assessment for written testing pro-

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<sup>21</sup> Figure 3-8 shows 11 components of assessment that will not change and 16 that will expand. In addition, there are the 2 components of assessment that will be converted to written testing for a total of 29 components.

<sup>22</sup> Alexandra Wigdor and Bert F. Green, Jr. (eds.), *Performance Assessment in the Workplace, Vol. I* (Washington, DC: National Academy Press, 1991); and John Hunter, 'Causal Analysis, Cognitive Ability, Job Knowledge, Job Performance, and Supervisor Ratings,' *Performance Measure and Theory*, S. Lundy (ed.) (Hillsdale, NJ: Lawrence Erlbaum, 1983).

<sup>23</sup> Shavelson, op. cit., footnote 10.

duced many changes.<sup>24</sup> When written testing was stopped and students were assessed instead on performance, classroom lecturing on topics such as the muzzle velocity of guns and the functions of breech block locking bolts greatly diminished, desks were removed from the training rooms, equipment that the students were learning how to repair was brought in, and students began to spend much more of their time in class actually repairing equipment. The instructors complained that the new tests were too hard and they were right. The students' scores were very low on the performance tests. But their scores increased rapidly with each successive class of students in the program. Performance on the new assessments soon became the best predictor of grades in the class and correlations of the written tests with grades dropped precipitously. The only thing that was changed was the substitution of performance assessment for the written tests.

There is also a considerable amount of research showing that the imposition of high-stakes, standardized testing for basic skills on instruction in regular education tends to narrow the range of skills taught and learned by students.<sup>25</sup>

**The irony is that written methods of testing appear to be expanding in vocational education at the very time that questions are being raised in the rest of education about the effectiveness of standardized testing, and a great deal of experimentation is under way with methods of assessment, student profiles, and the like.**

There should be no mistake about what is being said here. Much of the expansion of testing and assessment that is now occurring in vocational education is in areas of assessment. A good example of one of the major new efforts in vocational assessment is the California Career-Technical Assessment Project (C-TAP—see box

3-A). C-TAP, which is in the process of being developed and tested, is a comprehensive system of assessment procedures and student portfolios organized in part around newly defined broad technical and occupational skills. But, in fact, this new system of assessment is only one of three new components of assessment planned for vocational education. And, meanwhile, two other new components of assessment in other states will be transformed into programs of written testing. The greatest expansion overall is occurring in methods of written testing.

### WHAT SKILLS WILL BE ASSESSED?

By 1995, states are planning considerable change in the skills that will be measured. This change has implications for reform in vocational education.

How the mix of skills assessed will change is shown in figure 3-9 for the four basic categories of skills that have been defined: vocational skills, generic workplace competencies, broad technical skills, and academic skills. As in the previous figure, the pattern is basically one of growth. There will be expansion of the skill areas of testing and assessment.

Before discussing figure 3-9 in detail, it should be noted that change in testing and assessment is represented in both figures 3-8 and 3-9 by the components and subcomponents of states' policies of testing and assessment that are new, expanding, or staying the same. The data presented provide a proxy for more direct measures of the change that is occurring in testing and assessment at the local level, such as in the numbers of students who are being tested or assessed and the amount of time they are spending in testing or assessment. (Data like this would be extremely difficult to obtain.) The expansion of states' policies frequently involves, for example,

<sup>24</sup>Norman Frederiksen, "The Real Bias in Testing: Influences on Teaching and Learning," *American Psychologist*, vol. 39, No. 3, March 1984, pp. 193-202.

<sup>25</sup>George Madaus, "The Influence of Testing on Curriculum," *Critical Issues in Curriculum*, 87th Yearbook of the National Society for the Study of Education, Laurel N. Tanner (ed.) (Chicago, IL: University of Chicago Press, 1988), pp. 83-121.

### Box 3-A: Career-Technical Assessment Project (C-TAP)

For the California State Department of Education, the Far West Laboratory for Education Research and Development is currently in the process of developing, pilot testing, and validating a statewide system of authentic student assessment for vocational-technical programs in the state. The system will be an integral part of the Career Vocational Division's occupational clusters strategy for vocation-technical education. The plan is to implement the system in high schools, adult education programs, and regional occupation programs/centers throughout the state.

Student mastery of core occupational content, as well as career skills and appropriate academic standards, will be assessed in an integrated way. The system involves the adoption of three kinds of standards: 1) a "framework" of occupational content standards in each of the cluster areas, 2) a series of so-called "career performance standards," and 3) standards for academic skills that are needed in the workplace and underlie the career performance standards. Two examples of these occupational clusters are animal science in agriculture and computer science and information processing in business. Career performance standards will be set in the areas of personal skills of attitude and time management, interpersonal skills, thinking and problem-solving skills, communication skills, occupational safety, employment literacy, and technology literacy.

Students will be certified as "work ready" for an occupational cluster. Student certification will signify that students have the knowledge, skills, and abilities to succeed in an occupational field; the system of assessment is primarily intended to certify students for further learning in an occupational area or an academic program of study. The curriculum standards may be changed in California so that all students will be decertified as ready for work.

Two different kinds of assessments are being employed in the C-TAP system—cumulative and administered.

#### Cumulative Assessments

The cumulative assessments provide each student with a record of their accomplishments and levels of achievement in high school to use in seeking employment. Most of the assessment products are highly dependent on initiative taken by the students. The three main components of cumulative assessment are a Supervised Practical Experience (SPE), an assessment project, and a portfolio.

*Supervised Practical Experience.* Students who are enrolled in an occupational program requiring an SPE have their work supervisor complete an evaluation form rating their skills in the seven career performance areas. Additionally, students are rated on skills specific to their vocational program required "on the job." The completed SPE evaluation form is included in the portfolio.

*Assessment Project.* Students complete and present an approved assessment project during the course of their program. Projects involve either the planning and development of a tangible end product or a written description

increasing the number of occupational program areas where testing or assessment will be conducted, revising the testing instruments that will be available from the state and expanding their numbers, adding a new category of skills to the state's testing or assessment program, or making testing or assessment a requirement (mandatory). All such changes in policy would increase the impact on students. Most of the changes planned by states are of these kinds. Essentially then, figure 3-8 represents the change in the numbers of

students who are being tested versus those who are being assessed, while figure 3-9 represents the growth that will occur in the number of students who will be assessed in different categories of skill.

It is important to point out a major difference between figure 3-8 and 3-9. Figure 3-8 shows the numbers of components of testing and assessment for academic and occupational skills. These are the same components as in figure 3-5, 3-6, and 3-7. In figure 3-9, each of the components of

and analysis of a significant “real world” experience in the student’s field, or both. Project ideas will be developed jointly by the student and teacher according to specific guidelines provided by the state for each occupational cluster. Ideally, parents and business and industry people are involved in the development of the students’ work. At the conclusion of the project, all students describe their learning experiences through an oral presentation.

*Structured Portfolio.* Students assemble a structured portfolio during the course of their high school program. The portfolio helps students organize and present a collection of their work for purposes of assessment and for presentation to prospective employers and/or advanced training institutions.

The portfolio can include a letter of introduction, a career development package, a research write-up, a completed SPE evaluation form, the assessment project results, and four or more work samples. The career development package will include a resumé, an employment or college application, and a letter of recommendation. The research write-up is accompanied by an original outline and at least one early draft that had been submitted for teacher review. The topics of the research write-up maybe selected by the student from choices related to safety, social consequences, business practices, and future trends in the student’s chosen field. The work samples are evidence of the student’s best work and maybe related to the student’s certification projector SPE. Work samples are selected for inclusion by the students with guidance from the teacher according to criteria established by the state. Work samples may be represented by actual products, photographs, videotapes, performances, written descriptions, or any other reasonable and appropriate means.

#### **Administered Assessments**

The administered assessments are structured exercises that are given to students at a certain time in order to assess their capabilities for performance.

*Project Presentation.* Students present details of their assessment project to a review panel and respond to questions from the panel. The panel may consist of teachers, parents, students, and industry representatives. The student’s presentation is evaluated according to specified criteria including oral presentation skills and ability to reflect on the project experience

*Written Scenario.* Students are presented with a written scenario representing a complex and realistic problem from their vocational area. Students have 45 minutes to respond in writing. They are judged on ability to apply content knowledge to address the problem presented in the scenario.

*On-Demand Test* Students take an on-demand test focusing on the career performance standards. Enhanced multiple-choice items, including interpretative exercises and open-ended responses, are emphasized.

SOURCE: Adapted from Far West Laboratory for Educational Research and Development, *Career-Technical Assessment Project* (San Francisco, CA: Nov. 2, 1992).

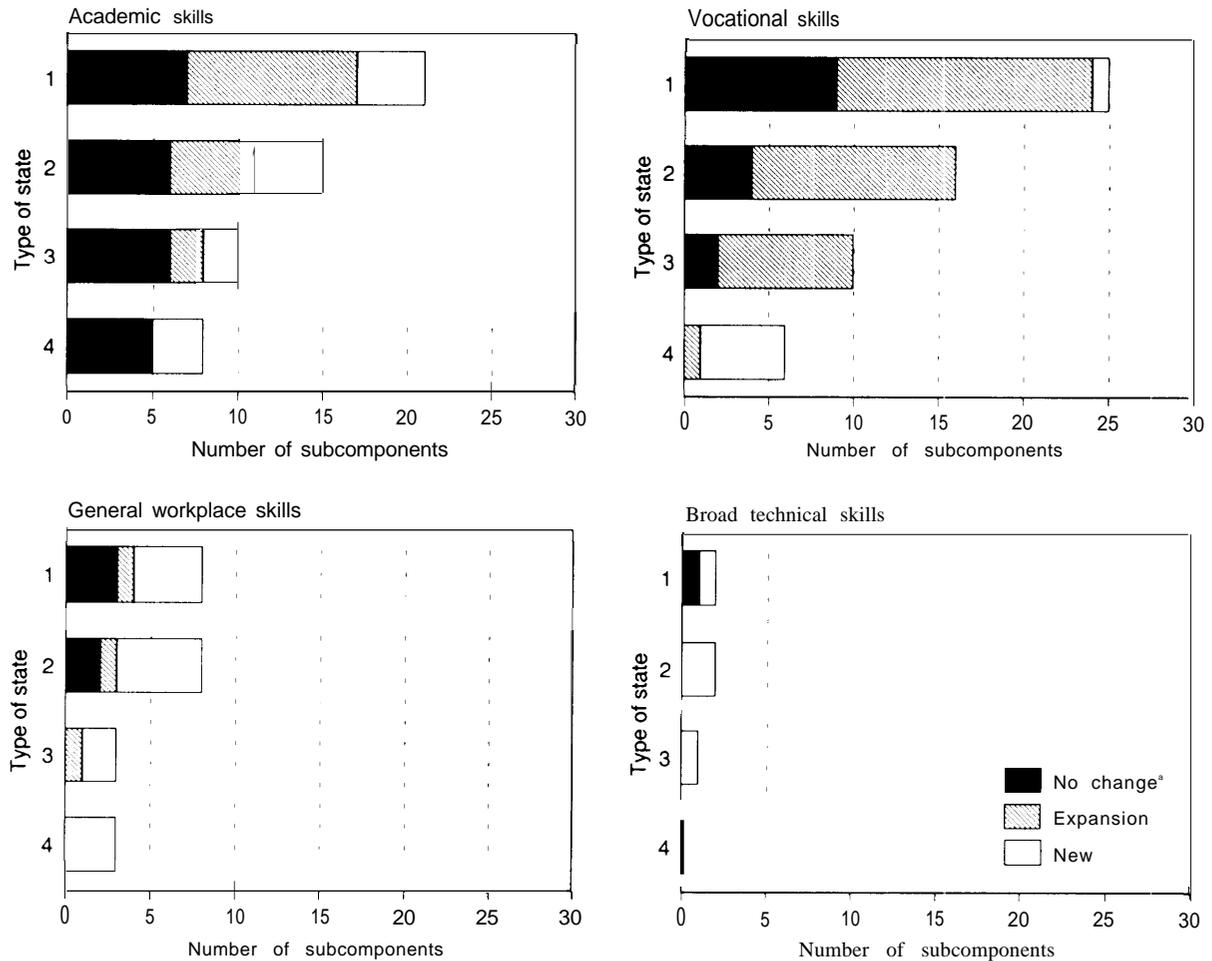
occupational skills are broken into subcomponents according to the number of different occupational skills that are assessed. Many of the components for assessing occupational skills involve the measurement of two, or in a few cases all, of the occupational skills—that is, vocational, generic workplace, and/or broad technical skills. Each of these subcomponents are represented as a single count in figure 3-9 even though it may only be part of a more extensive component of testing or assessment for occupational skills.

Included in figure 3-9 are 10 cases where both academic and occupational vocational skills will be assessed together by 1995-96.

#### **Academic Skills**

The most surprising result in figure 3-9 is that the slowest rate of expansion in state programs of testing and assessment will occur in the area of academic skills. State programs of testing and assessment for academic skills will *not change* in 24 of 41 components (59 percent) in which they

**Figure 3-9: Skill Areas of Planned Expansion in Testing and Assessment by 1995-96**



1 = Encourage testing    2. Mandate assessment    3 = Encourage assessment    4 = No policy

a one of these components of academic testing and assessment will contract.

SOURCE: Office of Technology Assessment, 1993.

were assessed in the 1992-93 school year.<sup>26</sup> The other 17 components (or 41 percent) will expand. Thirteen new components will also be added by 1995, which is a 27 percent increase in the total number of components by 1995. These new components will be mostly in states that had no

means for testing or assessing academic skills in place for 1992-93. These percentages of expanding, unchanging, and new components of testing and assessment for academic skills will be approximately the same across all four types of states.

<sup>26</sup>One component of testing or assessment for academic skills will contract. To simplify figures 3-8 and 3-9, this component is included in the data for components where there will be "no change."

### Vocational Skills

In contrast to the 41 percent rate of expansion for academic skills, testing and assessment for vocational skills will expand in 36 of the 51 subcomponents of state policy where they were assessed in 1992-93 school year, or at a rate of 70 percent of the existing subcomponents. In addition, testing or assessment for vocational skills will occur in six new components by 1995 for an increase of 12 percent.<sup>27</sup> The overall rate of expansion (including new subcomponents) for vocational skills will be even faster for generic workplace skills and broad technical skills, but the total amounts of testing or assessment for these two categories of skills in 1992-93 will still be considerably smaller than for vocational skills because of the smaller base. This means that among the four types of skills the largest total increase in testing and assessment will be for the conventional, occupationally specific skills of vocational education.

### Integration of Academic and Vocational Education

This slow rate of growth for testing and assessment for academic skills is surprising for several reasons. One is that academic skills are a new area for testing and assessment in vocational education, and another is the strong indications in the 1990 amendments that *gains* in academic skills should be at least one of the two performance standards established by the states. Test score gains are generally much more difficult to measure than attainments at any point in time and especially in a statewide, mass testing program. The fact that many of the states are relying on test score data from their state-level minimum competency exit examinations or some other statewide test, which is administered at a certain grade level, makes it very hard to see how they will be able to

show gains in students' academic skills over the course of their enrollment in vocational education. These difficulties indicate that state plans for expanding the capabilities for academic skills testing and assessment should be substantial.

Another apparent barrier to the integration of academic and vocational education is the substantial differences that exist between the methods of testing and assessment being used by states for academic skills compared to occupational skills, as discussed above. One of these differences is the heavy reliance on norm-referenced, standardized testing for academic skills compared to the criterion-referenced nature of testing and assessment for occupational skills. Another difference is that on the academic side, most of the testing and assessment is predominantly written, while on the occupational side, there is a mix of assessment and written testing. Furthermore, the testing for academic skills is typically centralized at the state level and conducted statewide on a mass basis at a given grade level, while on the occupational side the process is highly decentralized and tied to the local structure of courses and program completions.

A few statistics from the OTA survey tell this story of the divorce of testing and assessment for academic skills from occupational skills in stark terms. Only 10 of the 54 subcomponents of testing and assessment for academic skills planned by the states will be closely related to the testing and assessment for occupational skills at the local level—that is, in relation to the structure of courses or program completions, or in an ongoing program of assessment.<sup>28</sup> Various methods of doing this are being tried in the states involved but in only 5 of the 54 subcomponents are academic skills actually being tested for or assessed together with occupational skills in the context of the students' vocational and academic programs. In the other cases, a commercially

<sup>27</sup> While the rate of increase is only 12 percent, fewer states were without any capacity for testing or assessing vocational skills than academic skills. So the expected rate of new components of academic skills should be higher.

<sup>28</sup> The 10 subcomponents are not explicitly shown in figure 3-9.

developed academic test is being separately administered to students but in relation to their vocational course work.

The problems of reconciling academic and occupational test score and assessment information, and meaningfully interpreting it for purposes of monitoring or improving programs are formidable. Not paying close attention to these difficulties could lead to serious problems of misuse of test information and assessment results. If the content of the statewide academic tests does not reflect the academic content of the vocational or academic programs that are being integrated, then the resulting readings about the success of the efforts will be false. Also, the information from the academic tests may be in the form of “rank in class,” as is frequently the case with standardized written testing, while the information about occupational skills will tend to come from assessments and again be much more competency specific.

Considering all of these difficulties, and the priority in the legislation on integrating academic and vocational education, it is surprising how little effort states are planning to devote to revising and expanding their policies of testing and assessment for academic skills compared to expanding their resources for measuring occupational skills. The ways in which testing and assessment for academic skills is separated from testing and assessment for occupational skills indicates that academic and vocational education are possibly being driven further apart rather than closer together. It is very hard to see how the testing and assessment information being produced by the states could easily be used for purposes of the highly localized, school-by-school, program-by-program, and teacher-by-teacher efforts that are required to integrate academic and vocational education. The slower expansion of testing and assessment for academic skills that is planned, together with the fact that academic and occupational skills assessment will be combined in only 10 cases, implies that the expansion of testing and assessment for voca-

tional skills has higher priority for 1995 than the integration of academic and vocational education.

The inherent difficulties may explain a good part of the lack of plans for expanding academic skills assessment in the implementation of Perkins performance standards. Vocational educators may be understandably reluctant to initiate major coordination efforts with their statewide offices for academic testing, when this could involve substantial change in how testing and assessment is done and intrude in an area (the statewide academic testing program) where they have not been involved. The statewide office of academic testing may similarly be reluctant to coordinate their efforts with vocational education because it is unfamiliar territory and might involve substantial change in their approaches to testing and assessment. California’s new portfolio-based system of testing and assessment for occupational skills, which includes some assessment of academic competencies, and where efforts will be made to coordinate with the new, statewide system of performance assessment, provides one model of how statewide assessment of academic and occupational skills can potentially be coordinated.

### Generic Workplace Skills

A rapid expansion of testing and assessment for generic workplace skills is clearly in store. As shown in figure 3-9, the number of new subcomponents of testing or assessment for generic skills will exceed the number of existing components by nearly a factor of two for an increase of 175 percent. Most of the components of testing and assessment for generic workplace skills will be new in 1995. However, the large numerical size of this increase probably overstates the actual effects on learning and instruction in vocational education compared to effects of the planned expansion of testing and assessment for vocational skills, because generic workplace skills are the primary focus of testing or assessment in only 5 of the total of 22 cases. In the 17 other cases, the assessment

of generic workplace skills will be combined with the assessment of skills in one of the other categories of skills and be in a secondary role relative to those skills. Twelve of these 17 combinations are with vocational skills.

### Broad Technical Skills

Even after the planned fivefold expansion, the smallest category of capacity for testing and assessment will be for broad technical skills. Several reasons for this can be surmised. One is the lack of clarity about the nature of these broad technical skills, and instruments and methods for assessing them. Another is that the reorganization of vocational curriculum around broad technical skills has not been the object of as much reform pressure as has been the concept of integrating academic and vocational education. However, the priority on broadening occupational skills ap-

pears to be growing. Still, the greatest total expansion of testing and assessment in absolute amount will occur in the traditional area of vocational skills, which tend to be very job specific (see figure 3-9). At least so far, performance standards appear to be working against the reform of broadening occupational skills.

The numbers of subcomponents where more than one category of skills are included is growing. For example, in figure 3-9, the total number of subcomponents shown for the 109 components of testing and assessment planned by the states for 1995 is 138. This is an average of 1.26 skill areas per component of testing or assessment. The comparable number for the 1992-93 school year was 99 skill areas for the 92 components of testing or assessment, or 1.08 skill areas per component.<sup>29</sup>

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<sup>29</sup>In figure 3-8, state programs that involve the integration of testing and assessment for academic and occupational skills are treated as two separate components. Components of testing are "new" if they did not exist in 1992-93, or they will change by 1995 from either testing to assessment or vice versa. Subcomponents of testing or assessment for skill area are classified in the data as "new" only when the component is new. The addition of a new subcomponent of, for example, generic workplace skills to a program of testing or assessment for occupational skills is classified as a "new aspect of an existing component."