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REL CENTRAL
Regional Educational Laboratory
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for Education and Learning

High school standards and expectations for college and the workplace

ies NATIONAL CENTER FOR EDUCATION EVALUATION AND REGIONAL ASSISTANCE
Institute of Education Sciences
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June 2007

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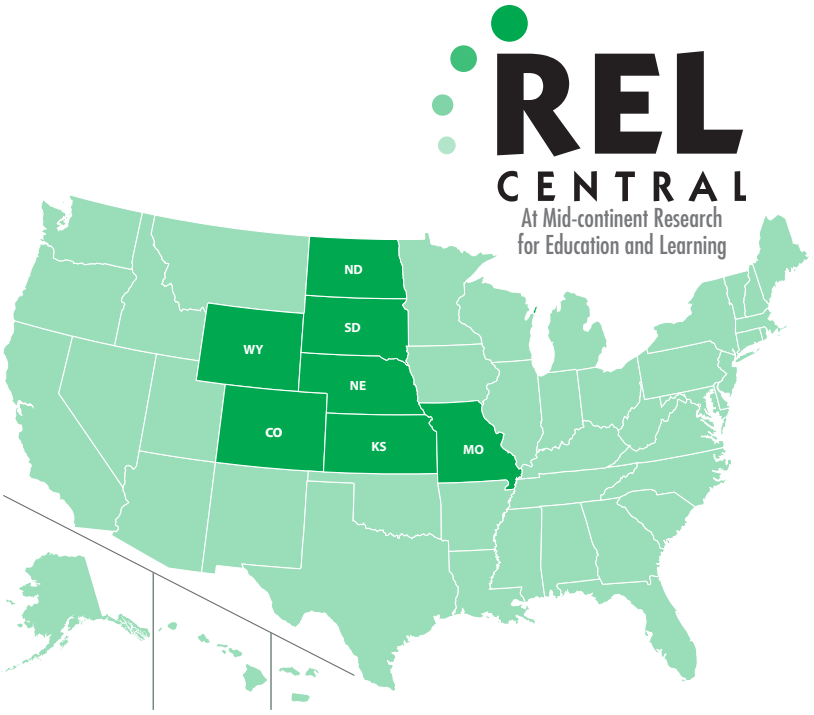

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Summary

High school standards and expectations for college and the workplace

State standards for high schools in a majority of Central Region states cover 82 percent of the language arts topics but just 57 percent of the mathematics topics identified by both of two national studies as important for success in college and the workplace.

Colleges and employers are growing increasingly concerned that high school students lack the knowledge and skills needed for success after graduation. To find out whether the expectations of the Central Region states match the expectations of colleges and the workplace, state standards for what students should know and be able to do in English language arts and mathematics are compared with expectations common to two national studies on skills needed for entry to college and the workplace. To get a sense of how states are performing generally, six states outside the region were selected as a comparison group, based on standards rated as exemplary by outside evaluators.

Academic standards in a majority of Central Region states (Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming) include 82 percent of the content in English language arts considered important by both national studies. Eight topics in English language arts were not commonly found in the Central Region's state standards, while four topics were missing in the standards for a majority of comparison states.

In mathematics just 57 percent of the topics considered important in the national studies were covered in the standards in a majority of the Central Region states reviewed. Twenty-five topics were not addressed in the standards for a majority of the states in the Central Region, and 22 topics were missing from the standards for a majority of comparison states. Although the comparison states fared somewhat better, the difference is not substantial.

Overall, the missing topics suggest areas for review for possible inclusion in the academic standards for the Central Region states.

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OVERVIEW

Colleges and employers are growing increasingly concerned that high school students lack the knowledge and skills needed for success after graduation. To find out whether the expectations of the Central Region states match the expectations of colleges and the workplace, state standards for what students should know and be able to do in English language arts and mathematics are compared with expectations common to two national studies on skills needed for entry to college and the workplace. To get a sense of how states are performing generally, six states outside the region were selected as a comparison group, based on standards rated as exemplary by outside evaluators.

The analysis finds that academic standards in a majority of Central Region states include 82 percent of the content in English language arts considered important by both national studies. Eight topics in English language arts were not commonly found in the Central Region's state standards, while four topics were missing in the standards for a majority of states selected for comparison.

In mathematics just 57 percent of the topics considered important in both of the national studies were covered in the standards in a majority of Central Region states reviewed. Twenty-five topics were unaddressed in the standards for a majority of the states in the Central Region, and 22 topics were missing from the standards for a majority of comparison states. Although the comparison states fared somewhat better, the difference does not appear to be substantial.

Overall, the missing topics suggest areas for possible inclusion in the academic standards for the Central Region states.

ARE HIGH SCHOOL STUDENTS PREPARED FOR COLLEGE OR WORK?

Post-secondary institutions find that high school graduates arrive less prepared than they have in the past, and many incoming freshman require remedial courses in reading, writing, and mathematics. The National Center for Education Statistics notes that post-secondary remedial education consists of "courses in reading, writing, or mathematics for college-level students lacking those skills necessary to perform college-level work at the level required by the institution" (Parsad & Lewis, 2003, p. iii). Not only are more students requiring remediation, but the amount of time they require for remediation has also increased. And these remediation problems are greatest in "broad access post-secondary

institutions," which admit almost every student who applies and educate about 80 percent of the nation's first-year college students (Kirst, 2003, p. 3).

Post-secondary institutions have long had an interest in determining whether high schools adequately prepare their college-bound students for post-secondary success

Post-secondary institutions have long had an interest in determining whether high schools adequately prepare their college-bound students for post-secondary success. Presumably, these institutions expect post-secondary remediation rates to decrease if the knowledge and skills required of all graduating high school seniors reflect the knowledge and skills students need to succeed at the post-secondary level.

Similarly, a picture of employers' concerns about the quality of entry-level workers emerges from recent studies that identify significant skill gaps among entering workers. For example, a recent skills-gap report from the National Association of Manufacturers/The Manufacturing Institute (Eisen, Jasinowski, & Kleinert, 2005) finds that a majority of American manufacturers are experiencing a serious shortage of qualified employees. In a 2004 poll of employers conducted for Achieve Inc., covering some 400 employers from sectors across the economy, employers expressed some dissatisfaction with the job that high schools are doing to prepare their graduates for several workforce skills, saying that they are dissatisfied with graduates' ability to read and understand complicated materials (41 percent of employers are dissatisfied), to think analytically (42 percent), to apply what they learn to solve real-world problems (39 percent), and to communicate orally (34 percent) (Hart Research Associates & Public Opinion Strategies, 2005, p. 6).

This study concerns the success of students who seek to further their education, whether through advanced skills training in industry or by attending college. Such students are at a significant competitive advantage over their peers who enter the workforce directly from high school. Whether high schools adequately prepare students who do not choose to further their learning, although not the focus of this study, is clearly of critical interest as well (for a discussion, see Barton, 2006). Many argue that all students should receive preparation that increases their likelihood of success, in part to "equalize opportunities across socioeconomic backgrounds so that no group of citizens is denied the benefits of a strong education" (Dougherty, Mellor, & Smith, 2006, p. 2).

As Carnevale and Desrochers (2003, p. 3) demonstrate, even if students do not graduate from college, attending some college has a significant impact on future success: "The fastest-growing and best-paying jobs have been those that require at least some college. Currently, six in ten jobs are held by workers with at least some post-secondary education or training, compared with two in ten in 1959."

Those who do not graduate from college face an ever-growing loss of opportunity and potential income over a lifetime. Between 1973 and 2000 the proportion of factory jobs held by individuals with at least some college education tripled and their wages held nearly steady, while wages declined for those with a high school diploma or less (Barth, 2003). It is not surprising, then, that in the public's mind a college education has replaced the high school diploma as the gateway to the middle class (Immerwahr, 2000).

Areas that are predominantly rural—such as the Central Region—are subject to additional pressures. The share of rural jobs in low-skill occupations fell between 1990 and 2000, mostly as a result of rising skill requirements and an increase in higher skill occupations (U.S. Department of Agriculture, 2005). New technologies will continue to affect the economic development of rural communities by increasing the number of high-skill jobs (Min, Sukhumaran, & Varghese, 2001). U.S. Department of Agriculture researcher Robert Gibbs (2005, p. 20) observes that "as the demand for workers with higher educational qualifications rises, many rural policymakers have come to view local educational levels as a critical determinant of job and income growth in their communities."

In short, the demand for highly skilled workers has meant that families and economists recognize that "whether bound for job or college, all students need high level academic knowledge and skills associated with college preparatory studies" (Somerville & Yi, 2002, p. 2).

WHAT THE STUDY SEEKS TO FIND: COMPARING STANDARDS AND EXPECTATIONS

Many states—including those served by the Regional Education Laboratory for the Central Region—are addressing student preparation under the broader rubric of high school reform. These efforts include a review of policies and programs to address the rigor of the curriculum (Martinez, 2005).

The Regional Educational Laboratory for the Central Region asked whether the seven states in the region (Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming) expect all high school students to obtain the knowledge and skills identified as important for success in college or high-skilled work.

The report compares the expectations in mathematics and English language arts that several states inside and outside the Central Region hold for all students against a set of expectations shared by colleges and employers for high school graduates, as identified in two national studies. The comparison of findings for the Central Region states with those from six states outside the region that receive high marks for the quality of their standards provides a broader perspective on the strengths and weaknesses in the region's state standards. The results can help local leaders responsible for setting high school exit criteria (high school principals, superintendents, and local board chairs); state officials who set graduation standards (education agency personnel, board members, and legislators); and post-secondary faculty ensure that the English and mathematics standards also satisfy the expectations of post-secondary institutions and employers of highly skilled workers.

MEASURING THE "EXPECTATIONS GAP"

Several methods have been proposed to measure the gap between expectations held by educators and what is needed for success after graduation. Approaches such as Stanford University's Bridge Project (Venezia, Kirst, & Antonio, 2003) focus on whether students are taking the courses that will help them develop the skills and knowledge that industry and college expect of them.

Related studies have examined course sequences to determine how they stack up against the entry requirements of post-secondary institutions. The courses are identified in terms of the Carnegie unit, a commonly used metric for describing one year of study. A recent report found that "no state's current standard high school graduation requirements are fully aligned with college admissions requirements" (Dounay, 2006a). The Carnegie unit is problematic as a measure of what students are learning, however, and has come under mounting criticism, most notably as a meaningless label of course content (Maeroff, 1993) that does not always signal success in college coursework.

Several methods have been proposed to measure the gap between expectations held by educators and what is needed for success after graduation

It is not surprising, then, that a study on the expectations gap (Achieve, 2004) finds that course titles do not describe course content so that it can be adequately compared with the knowledge and skills required by post-secondary institutions. To understand what is expected of students, the academic content itself must be the focus of study.

Measuring state expectations for students

Academic standards describe, with some specificity, what students should know and be able to do by the time they graduate from high school. Standards, which frequently have the force of legislation behind them, thus influence the content of courses in a way that course titles or Carnegie units cannot.

This study looked at whether the state standards that are established for all students, not just those who intend to continue academic work, will prepare them for success, whether they attend college or seek advanced training. For that purpose standards in English language arts and mathematics were analyzed for the Central Region states (Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming).

States in the Central Region promulgate academic standards widely. While there are no state-level high school exit exams, all states use assessments aligned with state standards in the language arts and mathematics to hold schools accountable (with the exception of Nebraska, which aligns assessments to the language arts standards only). This is consistent with the states' continuing interest in maintaining local education authority (Editorial Projects in Education Research Center, 2006).

To get a sense of how states in general might fare in this study, a second analysis was conducted on standards from six states outside the region (table 1). This second set of states was identified from among states singled out for having exemplary standards by the two national organizations that have reviewed all state standards for quality, Education Week's Editorial Projects in Education Research Center (2006) and the Fordham Foundation (Stotsky & Finn, 2005; Klein et al., 2005).[1] Table 1 identifies the states whose standards were analyzed for this study; most of these states were rated highly in both subject areas.

TABLE 1
States outside the region with exemplary academic standards in English language arts, mathematics, or both

State	English language arts	Mathematics
California	✓	✓
Georgia	✓	✓
Indiana	✓	✓
Massachusetts	✓	✓
Louisiana	✓	
New Mexico		✓

Source: Editorial Projects in Education Research Center 2006; Stotsky and Finn 2005; Klein 2005.

Establishing expectations for post-secondary education and the workplace

To determine how state standards compare with expectations held by employers and post-secondary institutions, state standards were compared against the content found to be common in two national studies: one that focuses on university expectations for high school graduates and another that identifies the expectations held by employers as well as universities.

Standards for Success (commonly abbreviated S4S), a project sponsored by the Association of American Universities in partnership with The Pew Charitable Trusts, sought to identify what graduating high school students need to know and be able to do to succeed in entry-level university courses. These student expectations, termed Knowledge and Skills for University Success, are presented in *Understanding University Success* (Conley, 2003), the product of a two-year study in which more than 400 faculty and staff members from 20 research universities participated in extensive meetings and reviews.

The American Diploma Project (2004, p. 1) shares a similar purpose—connecting secondary and post-secondary expectations for success—but its focus is on "what it takes for graduates to compete successfully beyond high school—either in the classroom or in the workplace." A partnership of Achieve, Inc., The Education Trust, and the Thomas B. Fordham Foundation, the project spent nearly two years working with two- and four-year post-secondary faculty and front-line managers in high-growth, high-skill occupations to define the core knowledge and skills that high school graduates need to succeed in their organizations. The results are presented in *Ready or Not: Creating a High School Diploma that Counts* (American Diploma Project, 2004), which describes

expectations, or benchmarks, for English and mathematics and includes sample tasks and assignments that illustrate how the knowledge and skills captured in the benchmarks might be applied in the workplace or college classroom.

Like state standards, these studies describe specific knowledge and skills students need; thus, they create a common metric for analysis. Taken together they represent the consensus of hundreds of professionals in universities and business and industry, individuals who encounter in their daily lives the students who leave U.S. high schools—unprepared, they argue. And these studies are national in scope, rather than specific to a region, a university, or an industry.

HOW STATE STANDARDS WERE COMPARED WITH NATIONAL STUDIES ON EXPECTATIONS

The study employed a comparative analysis model of academic content to identify the existence of an "expectations gap" (for details see appendix A; for limitations see box 1 and appendix A). A list of topic areas for each subject area was created from a comprehensive on-line database of content standards maintained by Mid-continent Research for Education and Learning, the Central Regional Educational Laboratory administrator. Content analysts, trained in the analytic method and with extensive experience in the subject area standards under review, made a fair inference about the topic's presence (or absence) in each of

BOX 1

Chief limitations of the content analysis approach

The chief limitations of the content analysis approach of this study relate to the scope of the subject area, the unit of analysis, and differing assumptions about prior mastery of skills (for more detail, see appendix A).

While definitions of the scope of subject areas are generally clear, different states may assign the same topic to different subject areas in their standards. For example, data analysis may appear in mathematics in some states' standards and in science in others'. Because it was not feasible to review standards documents across all subjects, some topics covered outside of English language arts and mathematics may wrongly have been coded as missing. This may account for a small part of the lack of alignment reported in the findings and for some portion of the mismatches between the two national studies (American Diploma Project and Standards for Success).

Content description requires selecting a unit of analysis. The content from the two national studies was mapped at the same level of topic specificity regardless of how a document was structured. For example, if statements in paragraph form contained several distinct concepts, each concept was assigned to its topic. This approach was taken to reflect the various types of specific information that one document might present about a topic, but another might not. Although applying a more general topic level of analysis would have significantly increased the number of matches between the two national studies, too much informative detail about the differences among these documents and the state standards would be lost. This problem may affect the findings in subtle ways. The matches that do appear may be accorded undue weight because there were so few matches between the two national studies overall. It would be an error to attribute such differences to significantly different viewpoints, however.

Another limitation common to a comparison of standards documents is that authors can make different assumptions about students' prior mastery of knowledge and skills. For example, one standards document might assert that students should be able to convert fractions to decimals; another document might consider that skill rudimentary and learned before high school. If a state's standards did not share the content found in the national reports, analysts also looked at that state's standards for the lower grades to ascertain whether the content had already been covered. In comparing the national studies, however, there was no way to determine whether content mentioned in one was absent from the other because it assumed earlier mastery.

the standards documents being compared and, if the topic was present, excerpted text to support their judgment. Decisions were reviewed by a second analyst, and disagreements (rare) were resolved with a third analyst. The topic list was expanded, when necessary, to accommodate all content present in the national reports and state documents.

The analysis proceeded by topic, not by grade or course, because states may organize standards by grade or by subject. The study also examined the level of performance expected of students for the content they were intended to learn, to determine whether state standards challenged students at the level described in the national documents. Content was determined to be missing from state standards if the topic was not addressed or, if addressed, students were not expected to reach the same or a better performance level as that in the national documents.

WHAT EXPECTATIONS ARE SHARED?

This report identifies a set of expectations for high school graduates in English language arts and mathematics that are shared by employers of highly skilled workers and institutions of higher learning and by a majority of the Central Region states and the majority of six comparison states with exemplary standards.[2] Unanimity was not required since reporting the findings according to whether all the states or none of the states shared the same standards would obscure much useful information.

Differences in the level of difficulty did not affect the outcome for any topic in either discipline

In nearly every case in which state standards shared the performance expectations from the national documents, the majority of states covered that topic at the same and sometimes even a higher level of difficulty. Differences in the level of difficulty did not affect the outcome for any topic in either discipline.

English language arts—a high rate of correspondence with national studies

In English language arts, of the 181 topics that the two national studies identify as expectations for students, they share 45, or 25 percent (figure 1). Of those a majority of Central Region states and of comparison states share 37 (82 percent). These topics are identified in appendix B, table B1.

Standards documents for a majority of Central Region states address 37 of the shared topics and fail to address 8 (18 percent). A majority of the comparison states selected for the highly rated quality of their standards address 41 topics and fail to address 4 (9 percent). Table 2 identifies the missed topics.

Mathematics—a lower rate of correspondence with national studies than in English language arts

Of the 122 topics that the national studies identify as expectations in mathematics for students, they share 69, or 57 percent (figure 2). Of those a majority of Central Region states and of comparison states share 38, or 55 percent. These topics are identified in appendix B, table B2.

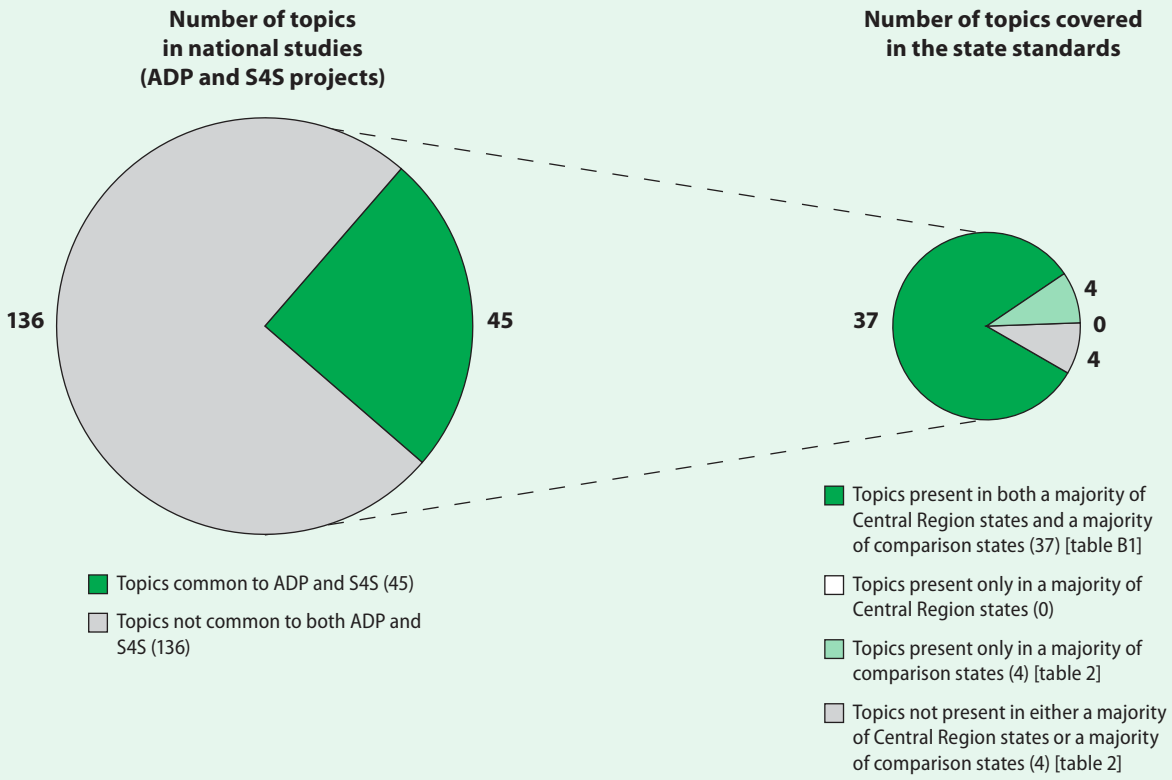
Standards documents for a majority of the Central Region states address 44 of the shared topics, or 64 percent, and fail to address 25 (36 percent). The comparison states selected for the highly rated quality of their standards did not fare appreciably better. Standards in a majority of states address 47 of the 69 topics that the national documents share and fail to address 22 topics (32 percent). Table 3 identifies the missed topics.

AREAS FOR FURTHER REVIEW

This review examined standards established for all students, not just those who intend to continue academic work. Thus, some of the topics that do not appear in a majority of the state standards may be taught only to a select group of students.

FIGURE 1

The distribution of topics among the documents analyzed for English language arts



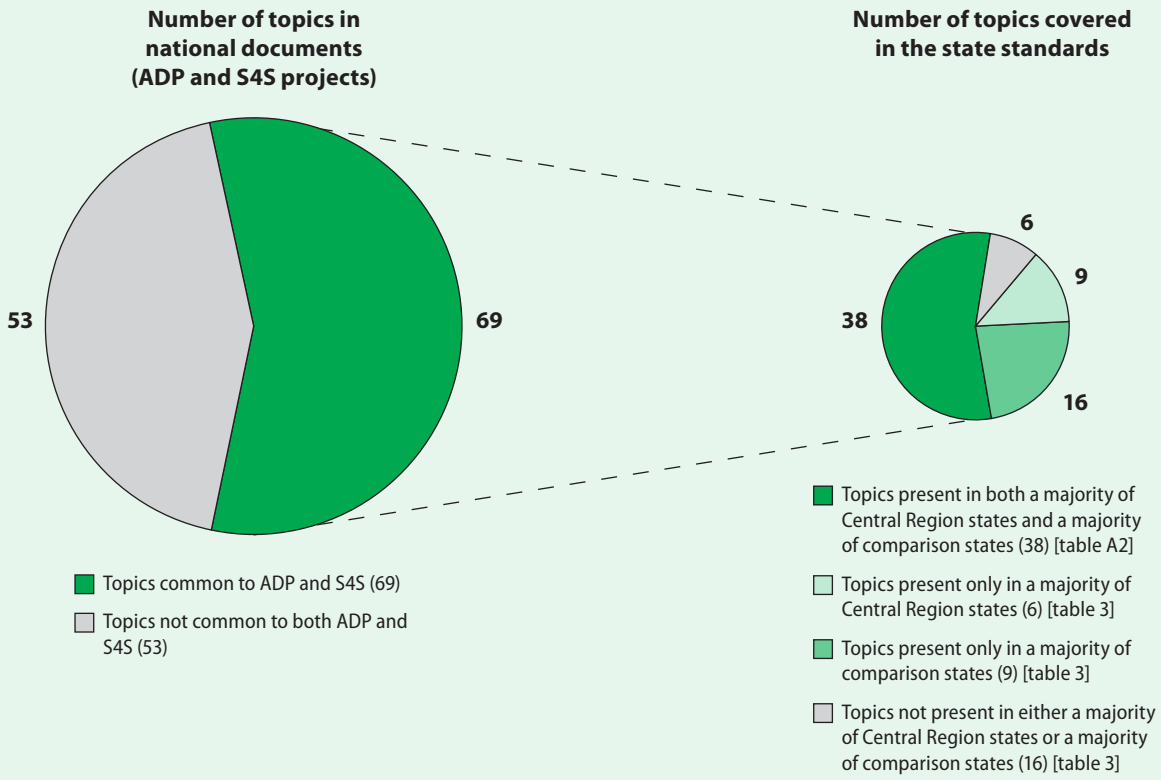
Note: ADP is American Diploma Project; S4S is Standards for Success.

TABLE 2

Language arts expectations shared by national documents and missing in a majority of Central Region states or a majority of comparison states with highly rated standards

Expectations shared by American Diploma Project and Standards for Success	Content missing from standards in a majority of Central Region states	Content missing from standards in a majority of comparison states
Evaluate the use of ambiguities, contradictions, and other devices (for example, overstatement and understatement) in texts	×	
Use graphic aids (for example, notes, outlines) to plan writing	×	
Distinguish characteristics of nonfiction writing forms	×	
Know major literary periods of American literature and their representative authors and texts	×	
Analyze historical documents	×	×
Know the characteristics of different types of graphic features (for example, charts, graphs, tables)	×	×
Evaluate the reliability, credibility, and overall quality of Internet sources	×	×
Understand inductive reasoning and deductive argument	×	×

FIGURE 2
The distribution of topics among the documents analyzed for mathematics



Note: ADP is American Diploma Project; S4S is Standards for Success.

Other topics, however, may not be systematically addressed at all, even for students on a college track. Educators, policymakers, and others who work to ensure that the high school diploma has value beyond K–12 education may find it useful to examine these results.

It would also be useful to understand why standards documents from the national studies do not share more of the same expectations for students. In English language arts just 25 percent of the content is shared; in mathematics, 57 percent. If the knowledge and skills necessary for high-skills workplace success are the same as those for college entry, it would be useful to understand why this is not reflected in the comparisons of national studies. It is clear, however, that difficulties inherent in content analysis account for some of this discrepancy (see appendix A). Even when both documents treat the same broad topic, each can emphasize different aspects when identifying specific concepts and skills. Not surprisingly, topics that reflect each organization's special interests—such as a strong background in literature for Standards for Success or skills in teamwork for the American Diploma Project—are not common to both.

Difficulties inherent in content analysis account for some of the discrepancies found in this study

The study also suggests that a separate review may be warranted to determine whether high school students who do not go on to attend college or advanced training are acquiring the skills they need to be successful in the workplace. Are state standards adequate to ensure that all students learn not just basic academic skills, but also the softer skills that employers require, such as the

TABLE 3

Mathematics expectations shared by national documents and missing in a majority of Central Region states or a majority of comparison states with highly rated standards

Expectations shared by American Diploma Project and Standards for Success	Content missing from standards in a majority of Central Region states	Content missing from standards in a majority of comparison states
Solve linear equations and inequalities involving absolute value	✕	
Understand domain and range of a function	✕	
Understand and use the properties of integer exponents and roots	✕	
Understand relative magnitude	✕	
Solve quadratics in one variable using various methods (for example, factoring, quadratic formula)	✕	
Understand the properties of rational exponents and roots	✕	
Simplify and perform basic operations on rational expressions	✕	
Understand the use of special symbols of mathematics	✕	
Use inductive reasoning	✕	
Understand basic right-triangle trigonometric definitions (for example, sine, cosine, tangent) and apply them to solve problems		✕
Define and give examples of integers, rationals, and reals		✕
Understand the use of and give examples of definitions, axioms, and theorems		✕
Solve systems of linear inequalities using graphical methods and graph the solution set of a system of two linear inequalities		✕
Use a variety of strategies to revise problem solving processes		✕
Use specific instances to understand general facts and extend specific results to general cases		✕
Know the algebra and geometry of circles	✕	✕
Know how to compose and decompose functions	✕	✕
Know the definition of complex numbers	✕	✕
Know the algebra and geometry of ellipses	✕	✕
Understand the relationship between logarithmic and exponential functions	✕	✕
Know how to find inverses of functions	✕	✕
Solve problems involving proofs using geometric constructions	✕	✕
Write simple geometric proofs such as the Pythagorean Theorem and sum of interior angles of a triangle	✕	✕
Divide low degree polynomials using long division	✕	✕
Know the properties of logarithms	✕	✕
Use identities for the sum and difference of angles, as well as double angle formulas	✕	✕
Using formal notation, use formulas for arithmetic and geometric progression and series	✕	✕
Use the Law of Sines and Law of Cosines to solve problems	✕	✕
Use the distance formula to find the distance between two points	✕	✕
Recognize reasonableness and errors of solutions	✕	✕
Use the process of modeling to determine mathematical concepts from external problems, reach a solution, and interpret the solution in the context of the problem	✕	✕

ability to solve problems, to work well with others, and to self-regulate? Such skills should also serve well students who go on to post-secondary education and advanced training.

The findings of this study cannot be meaningfully compared with studies based on the Carnegie unit or course titles and descriptions, which many states still use to establish requirements for graduation from high school. This underscores the problems of the Carnegie unit and its decreasing utility as a method for establishing or communicating student expectations. Future studies might investigate whether students whose preparation is directed by a set of standards that meet college-level entry requirements, for example, are less likely to need remediation than students who simply meet entry requirements as defined in Carnegie units.

NOTES

1. Standards documents were selected from among those receiving high rankings from the only two national organizations that have reviewed all state standards in the subject areas for their quality, *Education Week*'s Education Projects in Education Research Center (EPERC) and the Fordham Foundation. In rating state standards for clarity and specificity, *Education Week* relied on data from the American Federation of Teachers (EPERC, 2006). The Fordham Foundation reviews of English language arts (Stotsky, 2005) and mathematics (Klein, 2005) develop and apply a number of discipline-specific criteria to evaluate the standards, as well as broader criteria, including whether the standards are clear, measurable, and in an appropriate sequence for learning. Analysts identified a handful of states rated most highly by both organizations. The final selection of six states accorded with the Regional Educational Laboratory's perception of high quality standards based on experience reviewing and revising many state and district standards documents over the last decade. It is of interest that all the states identified as having strong standards employ high school exit exams, while none of the Central Region states do.

2. No state-by-state specifics are provided in this report. State departments of education in the Central Region have been provided the results of their state-specific analysis.

APPENDIX A
METHODOLOGY AND LIMITATIONS

This study employed a comparative analysis model of academic content to determine whether and to what extent an "expectations gap" could be identified.

Data and analytic process

Rather than consider the expectations gap through a review of course and credit requirements, this study focused on the knowledge and skills that all students are expected to learn to graduate from high school. Although states commonly express graduation requirements in terms of Carnegie units, the same states also establish expectations for students through academic standards. Standards describe, with some specificity, what students should know and be able to do by the time they graduate from high school. Such standards are commonly developed by and represent a consensus of stakeholders in the success of schools, which include not only educators, but parents and community and business leaders. In addition, standards frequently have the force of legislation behind them and thus influence the content of courses in a way that course titles or Carnegie units cannot. Such standards are made readily available to teachers, students, parents, and others through postings on the web sites of state education agencies.

State standards identified as important for all students, not just those who intend to continue academic work, were analyzed for this study. There is increasing agreement that the demands for higher skills in the workplace converge with the skills required for college entry. It appears appropriate, then, to ask whether state standards established for all students will prepare them for success, whether they decide to attend college or seek advanced training. Accordingly, the standards documents selected for analysis were limited to those that were clearly intended to apply to all students. Ancillary documents, often provided by states to help give useful specifics about the content to be covered, were also analyzed if it was clear that the documents identified content applicable for all students. Standards in English language arts and mathematics from the Central Region states (Colorado, Kansas, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming) were analyzed.

Documents from the two national studies on employer and college expectations—the American Diploma Project (ADP; 2004) and Standards for Success (S4S; Conley, 2004)—provided an "anchor" with which the documents of states in the Central Region and a selected set of states outside the region were compared. Analysts reviewed each standards document against a list of topics for each subject area, providing excerpted text in each case as evidence for the presence of content appropriate to a specific topic. The primary role of the content analysts, who have training in the analytic method and a degree or significant experience in the subject-area standards under review, was to make a fair inference about the presence or absence of content within each document and to provide evidence for that judgment. Each assignment of content to a topic was reviewed by a second analyst. In the case of discrepant judgments, which were rare, the issue was resolved through deliberations with a third analyst. The topic list was developed originally from the Mid-continent Research for Education and Learning (the Central Regional Educational Laboratory administrator) standards database—a comprehensive online database of content standards—but was extended during the analysis to account for any specifics that were not part of the original set. That is, the topic list was expanded, when necessary, to accommodate all content present in the national reports and state documents.

The analysis proceeded by topic, not by grade or course, because states may organize standards by grade (9 through 12) or by subject (such as algebra or geometry). When a state's standards were organized by courses, the selection of courses for analysis depended on what was required for all students, according to information available either within the introduction to the state standards or on the state's web site, such as a reference to controlling

legislation. Similarly, for states that offer a guiding document, such as a curriculum framework, the document selected for analysis was that which provided the most specific information but which was also clearly intended for all students.

The study included an examination of the level of performance expected of students for the content they were expected to learn. This was done to determine whether state standards challenged students at a level equal to or greater than that described in the national documents (ADP and S4S). Whenever the level of difficulty could be inferred from the standards, a performance level was assigned, using a taxonomy of educational objectives developed by Marzano (2001). This taxonomy, which was likewise used to determine the level of performance common to the national studies, allowed analysts to compare expectations. Content was identified as missing from state standards if the topic was not specifically addressed or, if addressed, did not entail student mastery at a degree of difficulty expected by the national studies. For example, if both national studies required that students be able to use information to solve a problem whereas a state standard required only that the student know the information, the content was marked as missing from the state standard. In nearly every case in which the performance expectation from the national studies was shared, the majority of states that covered the topic did so at the same or a higher level of difficulty. Differences in the level of difficulty did not affect the outcome for any topic in either English language arts or mathematics. In other words, all content identified as missing from the majority of state standards was missing, rather than present but at a lower level of challenge.

Limitations of this approach

During the course of the study, a number of limitations became apparent that are not uncommon to content analysis. The limitations can be classified as related to subject area scope, unit of analysis, and differing assumptions for prior mastery of skills.

The scope of a subject area has many commonly accepted boundaries—for example, algebra falls within the scope of mathematics, but biology does not. Other topics, depending on emphasis, can be found either in science or in mathematics. Data analysis, for example, appears in some standards documents under mathematics, and in others under the natural or social sciences. It was not feasible to examine the standards documents across all subject areas to account for differing approaches to the organization of academic content. As a result of fuzzy boundaries, which occur in English language arts as well as mathematics, not all topics in the course of this analysis could be matched across all documents, even though it is possible that the topics appear in subject areas other than those studied. This problem may account for a small part of the lack of alignment reported in the findings.

The larger impact on the findings from subject area scope is a result of the choice to search state standards documents only for content common to both the ADP and S4S documents. For example, in English and language arts, the ADP document does not address students' knowledge or understanding of literature, as the S4S document clearly does. By contrast, the ADP document places considerably more emphasis on students' making oral presentations and working as part of a team. Such differences should not be surprising, given the interest of ADP in the success of students in the workplace, and the S4S concern that students enter a liberal arts education with a rudimentary understanding of the humanities. Such differences are not of primary interest for this study, however, which focuses on what all students who choose to advance their studies should master by the time they graduate. In fact, each organization provides a complement of analytic services to states that wish to know how they "stack up" against their set of standards. The approach taken here is unique in that it analyzes what is common to both types of standards and how state standards compare.

Content description requires selecting a unit of analysis. The content from all studies was mapped

at the same level of topic specificity regardless of how a document might be structured. For example, if statements tended to take paragraph form and contain several distinct concepts, the paragraph was split and each concept assigned to its appropriate topic. This approach was necessary to accommodate the various types of specific information that one document might present about a topic, but another might not. For example, one document might address the general topic of logical argumentation by stating that students should understand the difference between reasoning based on deduction and induction. The other document might address the topic of argumentation by specifying that students should understand how a claim should be supported by a warrant. Such differing approaches had the effect, especially when the ADP and S4S documents were compared, of fewer matches between the documents. Although moving to a more general topic level for analysis would have significantly improved the number of matches, it was determined that too much informative detail about the differences among these documents and the states would be lost.

This problem may affect the findings in subtle ways. The matches that do appear may be accorded undue weight because there were so few matches between the two documents overall. It would be an error to attribute such differences to significantly different viewpoints between the two groups that produced these studies. For example, the S4S document said that students should understand the relationship between a trigonometric function in standard form and its corresponding graph (for example, domain, range, amplitude, period, phase shift, and vertical shift). This idea does not appear in the ADP document, but an equally advanced idea does, yet does not appear in S4S—that students should understand that the trigonometric functions sine and cosine, and thus all trigonometric functions, can be extended to periodic functions on the real line by defining them as functions on the unit circle.

Another limitation common to the comparison of standards documents is that the authors of each document can and do make differing assumptions about students' prior mastery of knowledge and skills. For example, one standards document might assert that students should be able to convert fractions to decimals; another document, however, might consider that skill rudimentary and learned by the eighth grade or earlier. If, on first review, a state's standards did not share the content found in the national reports, analysts also read that state's standards at the lower grades. In a number of cases, analysts could confirm that the content had already been covered at these lower levels, and so they did not mark the content as missing. In the case of comparing the national documents from ADP and S4S, which have no comparable information about expectations at kindergarten through the eighth grade, analysts did not have the means to confirm whether one document assumed an earlier mastery of content found explicitly stated in the other; in such cases, no match could be established.

APPENDIX B
COMMON EXPECTATIONS

TABLE B1

English language arts expectations common to the American Diploma Project, Standards for Success, a majority of states in the Central Region, and comparison states with highly rated standards

Compare, contrast, and make connections across texts
Analyze how literature reflects its historical context (for example, through form, style, point of view, characters, setting)
Draw conclusions and make inferences based on information in text
Understand instructions in informational or technical texts
Interpret information in text graphics (for example, charts, graphs, tables, diagrams, maps)
Understand and interpret characteristics of literary genres
Understand the use of poetic and literary devices
Understand plot and character development in literary texts
Understand how similar themes are addressed in different texts
Understand the meaning of idioms used in text
Use word roots and cognates to determine meaning of unfamiliar words
Use context clues to determine the meaning of unfamiliar words
Use electronic resources (for example, spell check, grammar check) to aid writing
Evaluate the reliability, credibility, and overall quality of information sources
Use primary and secondary sources
Use a variety of print and electronic sources
Structure ideas in writing logically and coherently
Use paragraph structure and logical arrangement of paragraphs
Use transitions to achieve coherence in writing
Use a range of strategies to develop written arguments
Use persuasive rhetorical devices to develop an argument
Anticipate and address readers' counterarguments
Develop a thesis or thesis statement
Use evidence and details to support a thesis or position
Know rules for citing sources, including paraphrasing, summarizing, and quoting
Incorporate a variety of information into texts, representing a range of arguments and perspectives
Select and refine a research topic
Consider audience and purpose for writing
Use language and words that communicate precisely
Demonstrate control of English grammar and conventions
Use conventions of capitalization
Use conventions of punctuation
Use dictionaries and other resources to determine meaning and spelling of words
Use language appropriate to audience and purpose
Use appropriate format for workplace correspondence
Use editing skills to improve grammar and style
Ask questions for a variety of purposes

TABLE B2

Mathematics expectations common to the American Diploma Project, Standards for Success, a majority of states in the Central Region, and comparison states with highly rated standards

Understand absolute value
Know and use formulas for volume and surface area of three-dimensional objects
Calculate area and perimeter of basic figures
Perform basic operations that include variables
Compute and use summary statistics, such as measures of center (mean, median) and spread (for example, mode, standard deviation, range, percentiles, variance)
Know and use the properties and definitions of a circle
Understand various curve-fitting techniques, such as regression line and median-fit line for various applications (for example, making predictions)
Understand the symbolic and graphical definition of a function
Know how to make and use estimations
Know the shape and key characteristics of exponential functions
Factor polynomials using a variety of methods, such as difference of squares
Solve linear equations in one variable
Solve linear inequalities in one variable
Solve systems of linear equations using algebraic methods
Graph a linear equation
Solve multi-step problems
Understand functional notation
Use the correct order of operations
Plot useful graphs
Add and subtract polynomials
Understand and conduct simple proofs
Multiply polynomials
Understand the concept of slope
Understand the shape of quadratic functions and the relationship between a quadratic's real zeroes and roots of the graph
Describe a line by its linear equation (for example, $ax + by = c$)
Organize and display data in a variety of ways (for example, spreadsheets, scatter plot, line graph) and select the most appropriate
Know that geometric objects and figures can also be described algebraically
Represent data using a scatterplot
Use exponents and scientific notation
Know properties of similarity
Recognize and solve problems that can be modeled using a linear equation in one variable (for example, time, rate, distance problems)
Use calculators appropriately
Visualize solids and surfaces in three-dimensional space when given two-dimensional representations
Apply the Pythagorean Theorem and its converse to solve problems
Use deductive reasoning
Use multiple representations to solve problems
Know when to use an approximation or estimation instead of an exact answer
Represent problems using multiple representations

APPENDIX C
DOCUMENTS ANALYZED FOR THIS STUDY

American Diploma Project. (2004). *Ready or not: Creating a high school diploma that counts.* Washington, DC: Achieve, Inc. Retrieved September 5, 2004, from http://www.achieve.org/achieve.nsf/AmericanDiplomaProject?openform.

California State Board of Education. (1997). English-language arts content standards for California public schools, kindergarten through grade twelve. Retrieved August 22, 2006, from http://www.cde.ca.gov/re/pn/fd/documents/elacontentstnds.pdf.

California State Board of Education. (1997). Mathematics content standards for California public schools, kindergarten through grade twelve. Retrieved August 22, 2006, from http://www.cde.ca.gov/re/pn/fd/documents/math-stnd.pdf.

Colorado Department of Education. (1995, July). Colorado model content standards: Reading and writing. Retrieved January 27, 2006, from http://www.cde.state.co.us/cdeassess/documents/standards/reading.pdf.

Colorado Department of Education. (2005, September). Colorado model content standards: Mathematics. Retrieved January 30, 2006, from http://www.cde.state.co.us/ cdeassess/documents/standards/math.pdf.

Conley, D. T. (2003). *Understanding university success: A report from Standards for Success.* Retrieved August 15, 2004, from http://www.s4s.org/03_viewproducts/ksus/pdf/Understanding_Success.pdf.

Georgia Department of Education. (n.d.). English language arts standards. Retrieved August 22, 2006, from http://www.georgiastandards.org/english.aspx.

Georgia Department of Education. (n.d.). K-12 mathematics curriculum. Retrieved August 22, 2006, from http://www.georgiastandards.org/math.aspx.

Indiana State Board of Education. (2000). Indiana academic standards mathematics. Retrieved August 22, 2006, from http://www.doe.state.in.us/standards/welcome2.html.

Indiana State Board of Education. (2006). Indiana academic standards English/language arts. Retrieved August 22, 2006, from http://www.doe.state.in.us/ standards/welcome2.html.

Kansas State Department of Education. (2003, July). Kansas curricular writing standard 2, research. Retrieved January 27, 2006, from http://www.ksde.org/outcomes/std2research.doc.

Kansas Department of Education. (2004, January). Kansas curricular standards for mathematics education. Retrieved February 1, 2006, from http://www.ksde.org/outcomes/9th10thgrindrev.doc.

Kansas State Department of Education. (2004, December). Kansas curricular standards for writing. Retrieved January 27, 2006, from http://www.ksde.org/outcomes/kswritingstd.html.

Louisiana Department of Education. (n.d.). English language arts grade-level expectations. Retrieved August 22, 2006, from http://www.doe.state.la.us/lde/saa/1915.html.

Massachusetts Department of Education. (2000). Massachusetts mathematics curriculum framework. Retrieved August 22, 2006, from http://www.doe.mass.edu/frameworks/math/2000/final.pdf.

Massachusetts Department of Education. (2001). English language arts curriculum framework. Retrieved August 22, 2006, from http://www.doe.mass.edu/frameworks/ela/0601.pdf.

Missouri Department of Elementary and Secondary Education. (1996, January). The Show Me Standards: Framework for curriculum development in mathematics. Retrieved February 1, 2006, from http://dese.mo.gov/standards/math.html.

Missouri Department of Elementary and Secondary Education. (2004, October). The Show Me Standards: Communication arts grade-level expectations. Retrieved January 31, 2006, from http://dese.mo.gov/divimprove/curriculum/GLE/MAgle.html.

Nebraska Department of Education. (2000, December). Nebraska mathematics standards. Retrieved January 25, 2006, from http://www.nde.state.ne.us/ndestandards/AcademicStandards.htm.

Nebraska Department of Education. (2001, September). Nebraska reading and writing standards. Retrieved February 1, 2006, from http://www.nde.state.ne.us/ndestandards/documents/ReadingWritingStandards_000.pdf.

New Mexico Public Education Department. (2002). Mathematics content standards and benchmarks. Retrieved August 22, 2006, from http://www.nmstandards.org/standards/mathematics/.

North Dakota Department of Education. (2005, February). North Dakota English language arts content and achievement standards. Retrieved February 1, 2006, from http://www.dpi.state.nd.us/standard/content/ELA/ELA.pdf.

North Dakota Department of Public Instruction. (2005, April). North Dakota mathematics content and achievement standards. Retrieved February 1, 2006, from http://www.dpi.state.nd.us/standard/content/math/grades9&10.doc.

South Dakota Department of Education. (2004). South Dakota mathematics standards, 9–12. Retrieved January 25, 2006, from http://doe.sd.gov/contentstandards/math/standards.asp.

South Dakota Department of Education. (2005, September). South Dakota reading content standards. Retrieved February 1, 2006, from http://doe.sd.gov/contentstandards/languagearts/docs/Reading9_12.pdf.

South Dakota Department of Education. (2005, Sept.). South Dakota communication arts content standards. Retrieved February 1, 2006, from http://doe.sd.gov/contentstandards/languagearts/docs/Communication%20Arts%209-12.pdf.

Wyoming Department of Education. (2003, July). Wyoming mathematics content and performance standards. Retrieved January 25, 2006, from http://www.k12.wy.us/SA/standards/math.pdf.

Wyoming Department of Education. (2005, September). Wyoming language arts content and performance standards. Retrieved February 1, 2006, from http://www.k12.wy.us/SA/standards/lang.pdf.

REFERENCES

Achieve, Inc. (2004). T*he expectations gap: A 50-state review of high school graduation requirements*. Washington, DC: Author.

ACT. (2006). *Ready for college and the world of work*. Retrieved May 23, 2006, from http://www.act.org/path/policy/pdf/ReadinessBrief.pdf.

American Diploma Project. (2004). *Ready or not: Creating a high school diploma that counts.* Washington, DC: Achieve, Inc. Retrieved September 5, 2004, from http://www.achieve.org/achieve.nsf/AmericanDiplomaProject?openform.

Barth, P. (2003, Winter). A common core for the new century. *Thinking K–16*, *7(1)*, 3–31.

Barton, P. E. (2006, June). *High school reform and work: Facing labor market realities* (Policy Information report). Retrieved August 23, 2006, from Educational Testing Service, Policy Information Center Web site: http://www.ets.org/Media/Research/pdf/PICHSWORK.pdf.

Carnevale, A., & Desrochers, D. M. (2003). *Standards for what? The economic roots of K–16 reform.* Washington, DC: Educational Testing Service.

Callan, P. M., Finney, J. E., Kirst, M. W., Usdan, M. D., and Venezia, A. (2006). *Claiming common ground: State policymaking for improving college readiness and success.* Washington, DC: The Institute for Educational Leadership, The National Center for Public Policy and Higher Education, and The Stanford Institute for Higher Education Research.

Conley, D. T. (2003). *Understanding university success: A report from Standards for Success.* Retrieved August 15, 2004, from http://www.s4s.org/03_viewproducts/ksus/pdf/Understanding_Success.pdf.

Dounay, J. (2006a, April). *Alignment of high school graduation requirements and state-set college admissions requirements* (State notes). Denver, CO: Education Commission of the States.

Dounay, J. (2006b, January). *Ensuring rigor in the high school curriculum: What states are doing (*State notes). Denver, CO: Education Commission of the States.

Editorial Projects in Education Research Center. (2006). *Quality counts at 10: A decade of standards-based education. Education Week*. Retrieved December 1, 2006, from http://nces.ed.gov/programs/statereform/saa_tab2.asp.

Eisen, P., Jasinowski, J. J., and Kleinert, R. (2005). *2005 skills gap report: A survey of the American manufacturing workforce.* Retrieved June 5, 2006, from http://www.deloitte.com/dtt/cda/doc/content/us_mfg_Talent%20Management_112205.pdf.

Gibbs, R. (2005, November). Education as a rural development strategy. *Amber Waves, (3)5*, 20–25. Retrieved December 1, 2006, from http://www.ers.usda.gov/AmberWaves/November05/pdf/FeatureEducationNovember2005.pdf.

Hart Research Associates & Public Opinion Strategies. (2005). *Rising to the challenge: Are high school graduates prepared for college and work?* Washington, DC: Achieve, Inc.

Immerwahr, J. (with T. Foleno). (2000, May). *Great expectations: How the public and parents—white, African American, and Hispanic—view higher education* (Public Agenda report). Retrieved September 5, 2004, from http://www.highereducation.org/reports/expectations/expectations.shtml.

Kazis, R., Vargas, J., & Hoffman, N. (2004). *Double the numbers: Increasing postsecondary credentials for underrepresented youth*. Cambridge, MA: Harvard Education Press.

Kirst, Michael. (2003, September). *College preparation and grade 12 NAEP* (Report prepared for the National Assessment Governing Board). Retrieved June 5, 2006, from http://www.stanford.edu/group/bridgeproject/College%20Prep%20and%20Grade%2012%20NAEP.pdf.

Klein, D., Braams, B.J., Parker, T., Quirk, W., Schmid, W., Wilson, W.S., et al. (2005). *The state of state math*

standards 2005. Retrieved June 5, 2006, from http://www.edexcellence.net/foundation/publication/publication.cfm?id=338.

Kober, N., Zabala, D., Chudowsky, N. Chudowsky, V., Gayler, K. McMurrer, J. (2006, August). *State exit exams: A challenging year.* Retrieved December 1, 2006, from http://www.cep-dc.org/pubs/hseeAugust2006/HSEE2006FINAL.pdf.

La Marca, P. M., Redfield, D., & Winter, P. C. (2000). *State standards and state assessment systems: A guide to alignment.* Washington, DC: Council of Chief State School Officers.

Lerman, R. I. (2001). *Improving career outcomes for youth: Lessons from the U.S. and OECD experience* (U.S. Department of Labor Research and Evaluation Monograph Series 01-D). Retrieved November 28, 2006, from http://wdr.doleta.gov/opr/fulltext/document.cfm?docn=6151.

Maeroff, G. I. (1993, October 13). The assault on the Carnegie unit. *Education Week*. Retrieved August 1, 2004, from http://www.edweek.org.

Martinez, M. (2005). *Advancing high school reform in the states: Policies and programs.* Retrieved June 3, 2005, from http://www.principals.org/.

Marzano, R. J. (2001). *Designing a new taxonomy of educational objectives.* Thousand Oaks, CA: Corwin Press.

Min, J., Sukhumaran, B., & Varghese, S. (2001). *Internet-based economic development for rural communities.* Retrieved December 1, 2006, from http://www.eda.gov/ImageCache/EDAPublic/documents/ pdfdocs/1g3lr_5f12_5fiowastate_2epdf/v1 /1g3lr_5f12_5fiowastate.pdf.

Parsad, B., & Lewis, L. (2003, November). *Remedial education at degree-granting postsecondary institutions in fall 2000: Statistical analysis report* (NCES 2004-010). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved September 19, 2004, from http://nces.ed.gov/pubs2004/2004010.pdf.

Somerville, J. & Yi, Y. (2002). *Aligning K-12 and postsecondary expectations: State policy in transition*. Washington, DC: National Association of System Heads.

Stotsky, S., & Finn, C. E. (2005). *The state of state English standards 2005.* Retrieved June 5, 2006, from http://www.edexcellence.net/foundation/publication/publication.cfm?id=337.

Southern Regional Education Board. (2006). *Getting students ready for college and careers.* Retrieved December 1, 2006, from http://www.sreb.org/main/Goals/Publications/Students_Ready_College_Career.asp.

U.S. Department of Agriculture/Economic Research Service. (2005, October). *Low-skill employment and the changing economy of rural America* (ERR-10). Retrieved from http://www.ers.usda.gov/publications/err10/err10.pdf.

Venezia, A., Kirst, M. W., & Antonio, A. L. (2003). *Betraying the college dream: How disconnected K–12 and postsecondary education systems undermine student aspirations* (Final report from Stanford University Bridge Project). Stanford, CA: Stanford Institute for Higher Education Research. Retrieved August 15, 2004, from http://www.stanford.edu/group/bridgeproject.