Achieve, Inc.

Measuring Up

A Report on Education Standards and Assessments for

OREGON

Achieve's Benchmarking Initiative

About Achieve, Inc.

Achieve is an independent, bipartisan, nonprofit organization created by governors and corporate leaders to help states and the private sector raise standards and performance in America's schools. Achieve was founded at the 1996 National Education Summit and subsequently sponsored another Summit in the fall of 1999 that brought together over 100 governors, business leaders and education officials from around the nation.

Achieve helps states raise academic standards, measure performance against those standards, establish clear accountability for results and strengthen public confidence in our education system. To do this, we:

- help states **benchmark** their standards, assessments and accountability systems against the best in the country and the world;
- provide sustained **public leadership** and advocacy for the movement to raise standards and improve student performance;
- build **partnerships** that allow states to work together to improve teaching and learning and raise student achievement; and
- serve as a **national clearinghouse** on education standards and school reform.

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Prepared by Achieve, Inc. for

the Oregon Department of Education

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EXECUTIVE SUMMARY

Achieve, Inc. was created in 1996 by governors and business leaders to serve as a clearinghouse and resource center on education standards, assessment and accountability. As part of its mission, Achieve provides states with candid feedback on the quality of their academic standards and assessments. At the request of the Department of Education, Achieve conducted such an evaluation for the state of Oregon over the summer and fall of 1999.

This report presents the results of Achieve's in-depth evaluation of the quality, rigor and alignment of Oregon's standards and assessments in English and mathematics. In particular, it provides Oregon policymakers with answers to the following questions:

- How do Oregon's education standards compare with those of high-performing states and nations? Are the expectations for Oregon's students and schools high enough?
- How well do the Oregon assessments measure the knowledge and skills laid out in the standards?

By becoming one of the first states to seek out Achieve's benchmarking of state standards and tests, Oregon has demonstrated its commitment to establishing a world-class education system. The state understands that continuous improvement of standards and tests is necessary to keep pace with other states and nations. As Oregon enters its 10th year of implementing standards and tests, the state has the opportunity to reflect on what has worked well and what can be strengthened. This report should prove helpful in this regard, as our evaluation points to a number of strengths in the Oregon system and a number of areas that deserve special attention if the standards and assessments are to continue driving instruction and achievement in the right direction.

RESULTS FOR OREGON

✓ **Achieve's benchmarking evaluation found that Oregon's standards exhibit a number of strengths.** The standards are measurable, clear and largely jargon-free. The standards do not attempt to dictate pedagogy. And, the test specifications documents for reading, writing and mathematics help clarify expectations and provide a helpful bridge between the standards and assessments.

✓ **Achieve's review also found that there are a number of areas in the standards that need attention.** The organizational structure of the standards is unnecessarily intricate and potentially confusing. Despite the standards' helpful side-by-side format, a clear progression of knowledge and skills is not always evident. The standards tend to repeat content across several grades, which may lead some to believe that the Oregon standards are a "mile wide and an inch deep." And when compared to the benchmark standards, the mathematics standards are not as rigorous as they could be and sometimes underestimate what students are capable of achieving at particular grade levels. Finally, important expectations for early literacy, algebra and geometry are described inadequately and could be more demanding.

✓ **Achieve's review of Oregon's assessments in English and math found that they measure important content and skills laid out in the standards.** Overall, the state assessments do a good job of measuring the content and performances described by the standards. This is commendable, especially because other states we have worked with have had difficulty aligning their standards and tests.

✓ **However, the assessments measure some of the objectives specified in the standards better than others, thus covering the standards unevenly. Also, the assessments are not rigorous enough for the given grade levels and, in some cases, are less rigorous than the standards.** In many cases, the tests tend to measure lower-level skills and knowledge and thus fail to measure some important benchmarks. And, while the tests adequately measure the foundation skills, they do not always assess more cognitively demanding content. Overall, our review found that the tests could be strengthened by increasing the level of rigor in the assessments and by ensuring that the tests grow progressively more demanding as students grow older.

RECOMMENDATIONS FOR MOVING FORWARD

✓ **Combine the strengths of the standards and the test specifications into a new document that makes choices about what is most important for students to learn and provides explicit guidance to educators and the public about what is expected.** The state should supply more clarity and detail to educators and Oregon citizens by developing a new set of documents that:

- Streamline the standards' organizational structure by eliminating the largely redundant Common Curriculum Goals and Content Standards and focusing on and fleshing out the Benchmarks and Eligible Content.
- Make choices about what is most important for students to learn at each grade level and outline a thorough and challenging progression of content knowledge and skills through the grades.
- Raise the overall expectations in the standards by increasing the level of rigor and the depth of knowledge and skills demanded of students.
- Pay special attention to the gaps our review uncovered in the areas of early literacy, algebra and geometry.

✓ **When the next generation of assessments is developed, revise the assessments to address the issues this study uncovered.** After creating a new set of documents, the state should turn its attention to developing the next generation of standards-based tests and make sure the revised assessments:

- Align closely to the specific content knowledge and skills laid out in the new materials.
- Assess the depth of the standards as well as their breadth by measuring cognitively demanding concepts in addition to foundation skills.
- Are comparable to the rigor and depth in the new materials, and grow more rigorous as children grow older.

INTRODUCTION

In the three years since the 1996 National Education Summit, 49 states have developed academic standards for their students and are putting in place assessments to measure those standards. As states have made substantial investments in the new standards and tests, and as many states are beginning to hold students and schools accountable for performance, policymakers and the broader public want to know how their standards compare to what other states and countries expect of their students.

At the 1999 National Education Summit, the nation's governors, leading corporate executives and state education officials endorsed plans to advance these efforts further. Because state decisionmakers, taxpayers, parents and others need to know how well their state's standards compare to others' and whether their students meet those standards, Summit participants identified strengthening standards, assessments and accountability systems as a key priority for school reform. This work is already under way.

Achieve, Inc. was created by governors and business leaders in 1996 to help states ensure that they have in place standards that compare favorably with the academic expectations of high-performing states and nations and have developed assessments that measure student achievement accurately against those standards. An independent, bipartisan, nonprofit organization overseen by a Board of Directors composed of governors and corporate CEOs, Achieve serves as a clearinghouse and resource center on education standards, testing and accountability, working primarily with states to support their work in these areas.

BENCHMARKING TO THE BEST

One of the services Achieve provides to states is *standards and assessment benchmarking:* comparing a state's academic expectations against the best available models from the United States and the rest of the world. States like Oregon that have sought benchmarking services from Achieve are committed to raising standards for student performance and holding schools accountable for performance. They want to assure their citizens that the standards they have set for students compare favorably with the expectations other states and other nations, particularly states and nations in which educational performance is high, have for their students. They also want to know whether the tests they use to assess student progress against the standards truly measure what they expect all students to know and be able to do. And they want objective, credible, concrete recommendations for ways to improve their standards and assessments.

Benchmarking is a highly respected practice in the business world. It is an activity that looks outward to find best practice and high performance and then measures actual business operations against those goals. Benchmarking in education follows the same principle. It is appropriate at a time when state education reforms are focused on raising student and school performance, as states want and need an external yardstick to gauge their efforts.

By benchmarking academic standards and assessments, Achieve hopes to help states answer the following questions:

- How do our education standards compare with those of other high-performing states and nations? Are the expectations for our students and schools high enough?
- How well do the state assessments measure the knowledge and skills laid out in the standards?

Achieve is involved in benchmarking for another important reason. States traditionally have had limited access to high-quality, trustworthy information about education standards. This is partly due to the fact that the standards movement in education is relatively young. But it is also a result of the disparate nature of much of the work that has been done to date. While the standards reviews and "report cards" issued by other organizations have helped to focus national attention on the quality of standards, their judgments often have been in conflict and their tone has not always been constructive. States increasingly are looking for independent, credible advice on these issues.

Achieve's benchmarking efforts are not designed to grade or rank states. Instead, we have created a service that is diagnostic in nature and that yields detailed, reliable information that we hope states will find useful. In addition, our focus on assessments as well as standards, and on the alignment between standards and assessments, allows us to truly determine what the state expects all its students to know and be able to do and whether the state's standards are a strong enough foundation for the state's efforts to improve educational performance.

THE ACHIEVE BENCHMARKING METHODOLOGY

To help develop a sound and thorough methodology for benchmarking, Achieve piloted a process for analyzing the quality, rigor and alignment of standards and assessments in 1998 with two states, Michigan and North Carolina. In Michigan, Gov. John Engler was concerned that the public did not see the connection between the state's academic standards and assessments. Achieve's analysis found that the standards tend to be broad and general, while the assessments represent sound expectations for student performance. In North Carolina, Achieve found that the standards are generally strong, particularly in English and mathematics, but that the assessments are not as challenging as the standards imply.

Establishing and refining standards and assessments is an iterative process of continuous improvement; so, too, is designing procedures to judge their quality. We learned a great deal from the pilot efforts in Michigan and North Carolina, and accordingly, we refined the benchmarking methodology in 1999. We will continue to do so as our experience base deepens.

PHASE ONE: DEVELOPMENT

The foundations for Achieve's two-step approach to judging the quality of standards and their alignment with assessments were laid when Govs. Engler and Hunt agreed to participate in the pilot study. At that time, Achieve contracted with two nationally recognized leaders in standards and assessment, the Council for Basic Education (CBE) and the Learning Research and Development Center (LRDC) at the University of Pittsburgh, to design and carry out standards and assessment benchmarking.

CBE designed the original procedure for benchmarking state standards to state, national and international "benchmark" standards recognized for their quality and/or for producing high student achievement. Using a scoring rubric developed for Achieve, CBE compared the content and skills set forth in the Michigan and North Carolina standards to several benchmark documents and further analyzed these state standards on the basis of their clarity, specificity and measurability.

The process for examining the extent to which the Michigan and North Carolina state assessments measure the standards was developed by LRDC. Skilled judges with expertise in academic content and assessment design applied a multistep procedure, or protocol, to determine the degree to which those states' assessments align with the standards. This protocol yields valuable information about strengths and weaknesses of the assessments.

PHASE TWO: REFINEMENT

The pilot project experiences with Michigan and North Carolina allowed Achieve to examine carefully the best methods and processes for benchmarking standards and analyzing the alignment of assessments to standards. As a result, in 1999, Achieve made a number of significant improvements to the benchmarking methodology. In refining benchmarking, Achieve staff and consultants drew on the work of CBE and LRDC in the pilot, as well as the findings and research from the Third International Mathematics and Science Study (TIMSS) and the work of other researchers and analysts.

After reviewing the processes for benchmarking state standards to benchmark standards and analyzing the quality and alignment of state assessments used in 1998, Achieve decided to improve the process in several critical areas:

- Achieve commissioned expert reviews of a variety of sets of standards to ensure that the benchmark standards documents used as exemplars are indeed the best standards for this purpose.
- Achieve took advantage of the best research and thinking about standards by asking nationally known and respected content experts to review the Oregon standards, paying special attention to their strengths and weaknesses when compared to the benchmark standards.
- Achieve strengthened the assessment-to-standards alignment protocol to capture the most important elements of alignment.
- Achieve relied on several standards and assessment judges with extensive expertise in content and assessment design to analyze the assessments.
- Achieve broadened the impact of the benchmarking evaluations by adding a significant training component, whereby state officials were trained in how to apply the benchmarking protocol.

PHASE THREE: WORKING WITH OREGON

The Achieve benchmarking process examined Oregon's academic standards against benchmark standards from California and Massachusetts in English and Arizona and Japan in mathematics and then compared Oregon's assessments against its state standards.

Standards Benchmarking

As noted above, to ensure that the benchmark standards documents used as exemplars in this work are among the best in the world, Achieve asked 10 national experts with deep content knowledge and experience in developing and analyzing local, state and national standards to examine nine respected sets of English and mathematics standards. California, Massachusetts, Arizona and Japan were selected as the best and therefore were used as benchmark documents for this round of work.*

Selecting these benchmarks proved to be a difficult task because no one set of standards is perfect and judgments about the quality of standards are subjective. Still, we are confident that the choices used in our current work reflect some of the best thinking from around the country and that a rigorous comparison of the state standards to these benchmarks will yield helpful diagnostic information and policy suggestions for states to consider.

In the future, Achieve will continue to examine documents as potential benchmarks. We may decide to use part of a document as an exemplar in one strand of a content area and simultaneously use a different part of another set of standards as an exemplar in another strand. For example, our English experts have suggested two other benchmarks that are particularly strong in the area of early literacy. We have taken their advice; this report incorporates comparisons of the Oregon standards for K–3 literacy to those of Texas and North Carolina as well as to those of California and Massachusetts.

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* Achieve created "benchmark profiles" for each of these documents that provide contextual information about the standards and summarize their strengths and weaknesses. These profiles are available upon request.

After Achieve selected the benchmark standards, our consultants constructed "side-by-side" charts comparing the content and skills found in the Oregon standards to those of the benchmark standards. Then, Achieve asked 12 national experts in standards and assessment to review Oregon's standards and the comparisons to the benchmark standards and react to a set of questions about the standards. These experts hold diverse opinions about content, standards, curriculum and assessment matters, and each has considerable experience in writing and researching standards and assessments. Achieve also asked another 10 standards and assessment experts to facilitate and conduct the assessment-to-standards analysis work.

Achieve brought these 20 experts together for two days to discuss the Oregon standards. This meeting proved extremely productive. The content experts did not agree on everything, but they did reach unexpected consensus on some important issues about standards, especially in the area of English language arts.

Achieve's consultants compiled the various reviews, highlighting the strengths and weaknesses of the Oregon standards as agreed upon by the experts and consultants. The findings described in this report represent, to the extent possible, the consensus opinions of Achieve's consultants and experts.

In reporting the findings, Achieve hopes to answer the following questions about Oregon's standards:

- Do the standards define a comprehensive yet manageable academic core for all students? Are there key concepts or skills missing in the standards?
- Do the standards convey both the breadth and depth of knowledge and skills expected of students? Have choices been made about what is most important for students to learn, and when they should learn it?
- Are the standards as rigorous as they should be? Do the expectations described by the state standards compare favorably to those of the benchmark standards?
- When compared to the benchmark standards, when is content introduced and at which grade levels is mastery expected?
- Do the standards define both what students should know (i.e., content knowledge) and what they should be able to do with that knowledge, or is one overemphasized at the expense of the other?
- Are the standards clear and explicit, conveyed in a way that educators and parents can understand and use to improve student achievement?

Aligning Assessments to Standards

First, drawing on the work done in the 1998 pilot project, Achieve staff and consultants refined and strengthened the procedure, or "protocol," for analyzing the alignment of assessments to standards. Determining how well a state assessment measures the content and skills laid out in the standards is a detailed, labor-intensive process requiring expertise and judgment. Achieve's protocol captures the most important elements of alignment and of the overall quality of state assessments.

Next, Achieve needed to expand the pool of expert consultants who could conduct the alignment analysis. Dr. Lauren Resnick of LRDC at the University of Pittsburgh, an internationally respected cognitive psychologist and expert on standards and assessment, was a key advisor to Achieve throughout the process of refining the alignment procedure and analyzing Oregon's assessments. Dr. Resnick and her lead staff helped Achieve identify several seasoned experts in teaching, curriculum, standards and testing. Achieve augmented this list with other similar experts.

Perhaps most importantly, Achieve also wanted to broaden the impact of its benchmarking work and respond to states' requests for help in building the capacity of their own agencies to ensure that state assessments are aligned with standards. For this reason, Achieve decided to invite state officials to be trained in the alignment analysis.

Achieve's process for determining the alignment of assessments to standards considers five dimensions.

- **Confirmation or construction of test blueprint.** Does each test question correspond to at least one state standard? If the blueprint provided by the test developer does not stand up to scrutiny (i.e., a significant number of items mapped to one standard or objective are found to be related more closely to a different one), then it is necessary for reviewers to construct a new test blueprint. Because test blueprints typically are the basis for state score reports, it is important that they be as accurate as possible.
- **Content centrality.** Does the content of the test item match the content of the standard it is intended to measure? Reviewers judge the consistency of the content in the item with the content in the standard. If a standard is too broad or unclear, reviewers may not give the related items high marks for content centrality.
- **Performance centrality.** Does the type of performance presented by each test item match the type of performance described by the corresponding standard? Each test item places a certain type of cognitive demand on a student, such as "select," "identify," "compare" or "analyze." If a test item simply requires students to "identify" a given fact, and the corresponding standard requires students to "analyze" a situation or interpret results, then there is a mismatch between the two performances.
- **Challenge.** This dimension includes two components. First, for each item, does the source of the challenge come from content in the standards that students must know to get the item correct, or is the question hard for some extraneous factor, such as the language of the item or tricks built in to confuse test takers? And, second, for a set of items related to a given standard, does the level of challenge represent a range of difficulty that is appropriate for the grade level tested?

- **Balance and range.** These criteria attempt to uncover whether certain concepts and skills delineated in the standards are emphasized on the assessment and, if so, whether they are emphasized at the expense of other important areas. Judges measure the extent to which the set of test items mapped to each standard reflects the balance and range of content and performance delineated in the standard. It is very difficult for one assessment to measure the full range of knowledge and skills required by the state standards. This step provides both quantitative and qualitative descriptive information about the choices states and/or test developers have made.

In July 1999, Achieve hosted a Standards and Assessment Benchmarking Institute for state education officials from Illinois, Indiana, Oregon and Pennsylvania. Led by Achieve's consultants, officials with responsibility for standards and assessment from each of the four states were trained in Achieve's alignment protocol. Working in subject-area teams, Achieve's consultants and the state officials then applied the protocol to each state's English and mathematics assessments (note: state officials analyzed tests from other states, not their own). The teams examined individual items and reached a consensus score for content centrality, performance centrality and source of challenge. The teams then examined entire sets of items related to each strand and made qualitative judgments about the level of challenge and balance and range.

Lists of Achieve's experts and consultants who participated in the standards benchmarking and assessment analysis for Oregon can be found in the appendix to this report.

RESULTS FOR OREGON

Oregon has "Teaching and Learning Standards" in the four core subjects at grades 3, 5, 8, 10 (when the Certificate of Initial Mastery may be earned) and 12 (when the Certificate of Advanced Mastery may be earned), and Proficiency-Based Admissions Standards System (PASS) criteria that students must meet to demonstrate college readiness. The standards contain several layers of increasingly specific expectations: overarching strands (i.e., Reading: comprehend a variety of printed materials), Common Curriculum Goals, Content Standards, Benchmarks and Eligible Content. Oregon assesses its students with state-developed criterion-referenced tests in grades 3, 5, 8 and 10 in English and mathematics, and in grades 5, 8 and 10 in science and social studies. The grade 10 test is not an exit exam, but students who pass the test in all four subjects are awarded a Certificate of Initial Mastery (CIM). The Oregon assessments are constructed on the basis of the Teaching and Learning Standards as well as the Test Specifications documents in reading, writing and mathematics, which include Eligible Content, Explanation of the content standard, Example Items, reporting categories and the percentage of items per category that must be on each test form.

Achieve's benchmarking study was conducted for English and mathematics only. Achieve analyzed Oregon's Teaching and Learning Standards and Test Specifications for grades 3, 5, 8 and 10 and its reading, writing and mathematics tests for grades 5, 8 and 10. Each English test for these grades consists of 75 multiple-choice questions, organized in two 50-minute sessions, that assess the Reading and Literature standards, as well as one open-ended question that assesses writing. The mathematics tests consist of 60 multiple-choice items and three open-ended, on-demand problems from which students must select and answer one. In both English and mathematics, Oregon has incorporated extended tasks or "work samples" into the state assessment system. These classroom tasks are designed to measure student achievement of the standards and are evaluated according to the same criteria as the on-demand assessments.

MAJOR FINDINGS: OREGON'S ENGLISH LANGUAGE ARTS AND MATHEMATICS STANDARDS

Strengths of the Standards

In general, Achieve's expert review of Oregon's English and math standards found some substantial strengths.

1. The standards are measurable and use clear, jargon-free language.

For the most part, the standards — especially the Eligible Content expectations — use measurable and clear language, which makes them understandable and more useful to students, teachers, parents and others. For example, grade 8 math students are asked to "find and/or interpret the zeros, maximum or minimum from the equation or graph of linear, quadratic, or exponential functions." Similarly in English, students are asked to "identify or summarize the order of events or a specific event from a sequence of events." Though the Content Standards and Benchmarks are sometimes less measurable and tend to use more jargon than the Eligible Content, these expectations also are written clearly.

2. The standards do not attempt to dictate pedagogy.

Importantly, the standards honor teachers' professionalism by describing the content students need to learn and allowing teachers to use their professional judgment to determine the appropriate instructional strategies for enabling students to learn the content. This is what content standards, in general, are supposed to do. An exception is specific guidelines for developing early literacy, which a growing consensus of literacy experts believe should describe the strategies and activities needed to teach young students to read, write, listen and speak.

3. The test specifications documents help clarify expectations for teachers and students.

The accessibility of the standards is enhanced by the test specifications for reading, writing and mathematics. Rather than simply providing technical guidance to test developers, like most such documents do, the Oregon test specifications help parents, teachers and test developers understand the expectations for student performance that are outlined by the standards and measured on the tests. In fact, in some cases, the test specifications provide detail above and beyond that provided in the Content Standards, Benchmarks and Eligible Content. The Explanation often expands on the subtopics implied or described within each strand, and the inclusion of Example Items also gives a sense of the intent of the goals for learning in that area. Our experts noted in particular that the test specifications for writing provide well-spelled-out expectations for writing skills, while the specifications for reading and literature and mathematics indicate the general domains of knowledge and types of questions the test may cover.

Areas Needing Improvement

In spite of these strengths, our review found several key areas in which the standards could be improved, some of which are more important than others. In particular, Achieve's experts found that Oregon's standards are too repetitive across the grades and do not increase sufficiently in complexity and sophistication as students grow older. As a result, the standards may be perceived to be a "mile wide and an inch deep." Moreover, the standards' organizational structure is potentially confusing, and the standards are not as rigorous as they could be, particularly when compared with the benchmark standards from California, Massachusetts, North Carolina and Texas in English and Arizona and Japan in math. Our experts also noted some specific instances of key concepts that could be developed more fully.

1. The standards' organizational structure is unnecessarily intricate and potentially confusing.

Over the past several years, Oregon has taken seriously a commitment to improve the quality and depth of its standards continuously without signaling to the public a change in course. To improve the standards, the state has provided additional detail and guidance over the years by developing new, successive layers of information. The result: The standards' organizational structure currently includes five layers, including the overarching strand (i.e., Reading or Calculations and Estimations), Common Curriculum Goals, Content Standards, Benchmarks and Eligible Content in italics beneath the Benchmarks. The standards' helpful side-by-side format displays the five layers at the end of grades 3, 5, 8, 10 and 12 in succeeding columns on each page. Moreover, the standards' most specific layer, the Eligible Content, does not appear in all content strands or grade levels. This format shows the state's conscious effort to create a framework to chart increasing depth of content and skills over time and to show when content is introduced and when it should be mastered.

In places where this structure is used effectively, the expectations flow from the more general to the more specific. Many times, however, the Content Standard that follows is essentially or exactly the same as the Common Curriculum Goal; sometimes, no Benchmarks accompany the Content Standard; and sometimes, no Eligible Content explicates the Benchmark. Generally, the Common Curriculum Goals, Content Standards and Benchmarks are identical across several or all grade spans. And, as the examples below will show, while one or two new objectives in the Eligible Content may be introduced at each grade level, often these objectives are additions to, rather than replacements of, bullets from previous years. (The implications of this structure are discussed in greater detail below in findings #2 and #3.)

Consider the following example from the Estimation strand:

Calculations and Estimations: Select and apply mathematical operations in a variety of contexts.

Common Curriculum Goals	Content Standard	Grade 3 Benchmark	Grade 5 Benchmark	Grade 8 Benchmark	CIM/ Grade 10 Benchmark	CAM/ Grade 12 Benchmark
ESTIMATION						
Use estimation to solve problems and check the accuracy of solutions.	Use estimation to solve problems and check the accuracy of solutions.	Estimate solutions to problems and determine if the solutions are accurate and reasonable. *Students will:* • *Round one-, two-, or three-digit numbers to the nearest 10, 100, and 1,000 for addition and subtraction problems.* • *Directly estimate real-world events to the nearest 10 and 100, e.g., grocery bill.* • *Round one-, two-, or three-digit compatible whole numbers to the nearest 10, 100 for multiplication and division applications.* • *Determine cost to the nearest dollar amount for amounts under $100.*	Estimate solutions to problems and determine if the solutions are accurate and reasonable. *Students will:* • *Round (with ranges from the nearest hundredth to the nearest ten thousandth) to estimate answers to calculations.* • *Recognize which place will be the most helpful in estimating an answer.* • *Multiply by powers of ten up to 1,000 to simplify calculations.* • *Use front end estimation to predict ranges for quotients.*	Estimate solutions to problems and determine if the solutions are accurate and reasonable. *Students will:* • *Round (with ranges from the nearest thousandth to the nearest million) to estimate answers to calculations.* • *Recognize which place will be the most helpful in estimating an answer.* • *Multiply by powers of ten up to 1,000 to simplify calculations.* • *Use front end estimation to predict ranges for quotients.* *Students will also round percentages, ratios, and fractions.*	Estimate solutions to problems and determine if the solutions are accurate and reasonable. *Students will:* • *Round to estimate answers to calculations.* • *Recognize which place will be the most helpful in estimating an answer.* • *Multiply by powers of ten to simplify calculations.* • *Use front end estimation to predict ranges for quotients.*	Estimate solutions to problems and determine if the solutions are accurate and reasonable. Use estimation to verify results and identify potential errors when using technology.

As is clear from this example, the five layers are a mixture of sometimes identical, sometimes similar and sometimes new items at successive grade levels. This mixture is confusing and does not describe in greater detail what students are learning in each grade, nor does it necessarily convey a progression from grade span to span.

In contrast, the following excerpt from the grade 8 Japanese standards for algebra illustrates how standards can use a few layers *within* each grade level to develop concepts and provide sufficient guidance to educators and the public about the depth of content students should learn.

A. Numbers and Algebraic Expressions
   (1) Carry out the four fundamental operations of simple algebraic expressions using letters.
      a. Addition and subtraction of simple polynomials.
      b. Multiplication and division of monomials.
   (2) Find quantitative relationships in phenomena, represent such relationships in an algebraic expression by using letters, and utilize them.
      a. Make use of algebraic expressions.
      b. Transform simple equalities.
   (3) Understand the meaning of inequality and apply linear inequalities.
      a. Inequality and the meaning of its solution.
      b. The properties of inequality.
      c. Solve linear inequalities.
   (4) Understand the meaning of simultaneous linear equations and their solution, and apply them.
      a. The meaning of linear equation with two variables and its solution.
      b. Solve simple simultaneous linear equations.
   (5) Understand functional relations, understand the characteristics of linear functions and make use of them.
      a. Some phenomena may be represented by use of linear functions.
      b. The ratio of changes in the values of linear function and characteristics of the graph.
      c. A linear equation with two variables may be considered to represent the functional relationships between two variables.

2. Despite the standards' helpful side-by-side format, a clear progression of knowledge and skills is not always evident.

Our review's potentially most significant finding is that the expectations for Oregon students do not appear to grow adequately. As discussed above, much of the language in the standards is identical across grade spans. This repetition tends to dilute progression; the standards sometimes fail to illustrate the necessary growth and increase in complexity and sophistication of content through the grades.

A good deal of content is introduced early on and repeated through two or more grade spans without describing in greater detail or clearly differentiating what makes the grade 10 content different from the

grade 5 content. Clearly, some content requires more explication, and some requires less, but our experts did not always find that more important content is emphasized and explained in these standards. Rather, the choices made to provide additional explication are sometimes arbitrary or random. The result: Teachers have few additional clues to understand the milestones students would reach on their way toward reaching the standards, most content in the standards appears to be required of students at three or four grade levels, the standards appear to be more voluminous than they actually are, and content that should be covered may be squeezed out.

Consider the following example from the Reading strand:

Reading: Comprehend a variety of printed materials.

Common Curriculum Goals	**Content Standard**	**Grade 3 Benchmark**	**Grade 5 Benchmark**	**Grade 8 Benchmark**	**CIM/ Grade 10 Benchmark**	**CAM/ Grade 12 Benchmark**
Demonstrate literal comprehension of a variety of printed materials.	Demonstrate literal comprehension of a variety of printed materials.	Retell, summarize, or identify sequence of events, main ideas, facts, and opinions in literary and informative selections. *Students will identify or summarize:* • *The order of events or a specific event from a sequence of events.* • *A statement or sentence indicating the main idea of the selection.*	Identify sequence of events, main ideas, facts, supporting details, and opinions in literary, informative, and practical selections. *Students will identify or summarize:* • *The order of events or a specific event from a sequence of events.* • *A statement or sentence that best indicates the main idea of the selection.*	Identify sequence of events, main ideas, facts, supporting details, and opinions in literary, informative, and practical selections. *Students will identify or summarize:* • *The order of events or a specific event from a sequence of events.* • *A statement or sentence that best indicates the main idea of the selection.*	Identify sequence of events, main ideas, facts, supporting details, and opinions in literary, informative, and practical selections. *Students will identify or summarize:* • *The order of events or a specific event from a sequence of events.* • *A statement or sentence indicating the main idea of the selection.*	Summarize literal meaning in literary, informative, and practical selections. Identify main ideas, opinions, and significant supporting details in selections.

(table continued on p. 16)

Common Curriculum Goals	Content Standard	Grade 3 Benchmark	Grade 5 Benchmark	Grade 8 Benchmark	CIM/ Grade 10 Benchmark	CAM/ Grade 12 Benchmark
		• *Directly stated facts, e.g., actions or events; directions for an experiment or problem solving exercise; information from charts/graphs; names of characters, places, or things in the selection; special circumstances relevant to the story.*	• *Directly stated facts, e.g., actions or events; directions for an experiment or problem solving exercise; information from charts/graphs; names of characters, places, or things in the selection; special circumstances relevant to the story.*	• *Directly stated facts, e.g., actions or events; directions for an experiment or problem solving exercise; information from charts/graphs; names of characters, places, or things in the selection; special circumstances relevant to the story.*	• *Directly stated facts, e.g., actions or events; directions for an experiment or problem solving exercise; information from charts/graphs; names of characters, places, or things in the selection; special circumstances relevant to the story.*	
			• *Details such as key words, phrases, or sentences that explicitly state important characteristics, circumstances, or similarities and differences in characters, times, or places.*	• *Details such as key words, phrases, or sentences that explicitly state important characteristics, circumstances, or similarities and differences in characters, times, or places.*	• *Details such as key words, phrases, or sentences that explicitly state important characteristics, circumstances, or similarities and differences in characters, times, or places.*	
		• *Directly stated opinions.*	• *Directly stated opinions.*	• *Directly stated opinions, including those introduced by transitional phrases.*	• *Directly stated opinions, including those introduced by transitional phrases.*	

While the Eligible Content expectations provide clear explanations for the broad standards described in the Content Standards and Benchmarks, they do not describe adequately how students' understanding of text should develop and grow over time.

In contrast, the standards in the benchmark documents grow and show more depth over time. Also, content is introduced at certain grade levels and removed when the state believes that students should have mastered the content. Compare the Oregon example above with similar content from California's standards in the following excerpt. Note that the quality and complexity of materials to be read are illustrated in a supplementary document and that students must read an increasing amount as they grow older.

Reading Comprehension

Students read and understand grade-level-appropriate material. They draw upon a variety of comprehension strategies as needed (e.g., generating and responding to essential questions, making predictions, comparing information from several sources). The selections in *Recommended Literature* illustrate the quality and complexity of the materials to be read by students. In addition to their regular school reading, by grade 8, students read one million words annually, including a good representation of grade-level-appropriate narrative and expository text (e.g., classic and contemporary literature, magazines, newspapers, online information).

Comprehension and Analysis of Grade-Level-Appropriate Text

Grade 3

1.2 Ask questions and support answers by connecting prior knowledge with literal information found in, and inferred from, the text
1.3 Demonstrate comprehension by identifying answers in the text
1.4 Recall major points in the text and make and modify predictions about forthcoming information
1.5 Distinguish the main idea and supporting details in expository text
1.6 Extract appropriate and significant information from the text, including problems and solutions
1.7 Follow simple multi-step written instructions (e.g., how to assemble a product or play a board game)

Grade 5

2.3 Discern main ideas and concepts presented in text, identifying and assessing evidence that supports those ideas
2.4 Draw inferences, conclusions, or generalizations about text and support them with textual evidence and prior knowledge

Grade 8

2.3 Find similarities and differences between texts in the treatment, scope, and organization of ideas
2.4 Compare the original text to a summary to determine whether the summary actually captures the main ideas, includes critical details, and conveys the underlying meaning
2.5 Understand and explain the use of a complex mechanical device by following technical directions
2.6 Use information from a variety of consumer, workplace, and public documents to explain a situation of decision and to solve a problem

The English standards' lack of progression through the grades is also true in the math standards. For example, the Direct Measurement Benchmarks and accompanying Eligible Content are almost exactly the same at grades 5, 8 and 10.

Grade 5 Benchmark	Grade 8 Benchmark	Grade 10 Benchmark
Measure length, perimeter, weight, area, volume, time, temperature, and angle using standard and nonstandard units of measurement.	Measure length, perimeter, weight, area, volume, temperature, angle, and distance using standard and nonstandard units of measurement.	Measure length, perimeter, weight, area, volume, temperature, angle, and distance of regular and irregular shapes using standard and nonstandard units of measurement.
Using any customary U.S. or metric units, students will: • *Read measurements from illustrations of rulers, clocks (digital or analog), scales, and thermometers.* • *Calculate perimeter, area, and volume from measurements given sides of polygons and edges of rectangular solids.*	*Using any customary U.S. or metric units, students will:* • *Read measurements from illustrations of rulers, clocks (digital or analog), scales, and thermometers.* • *Calculate perimeter, area, and volume from measurements given sides of polygons and edges of rectangular solids.*	*Using any common measurement unit or nonstandard unit of the student's devising, students will use diagrams or readings from illustrations of measuring devices to solve problems.*

Even when the words used to describe content change from grade level to grade level, the underlying content remains essentially the same or is only slightly more sophisticated. Compare the following excerpts from the grade 8 and grade 10 Benchmarks and Eligible Content for Expressions and Equations:

Grade 8 Benchmark	CIM/Grade 10 Benchmark
Investigate and solve linear and nonlinear equations and inequalities, using concrete, formal, and informal methods.	Solve equations and inequalities numerically, graphically, and/or algebraically. Use matrices to organize and represent information.
Students will investigate and solve linear and nonlinear equations and inequalities by: • *creating tables, coordinate graphs, or number lines.* • *directly solving equations and inequalities.* • *identifying the nth term in simple linear relations.* • *using pictorial models.*	*Students will be asked questions that call for:* • *solutions of single variable equations and inequalities.* • *graphs of one- and two-variable linear equations — slope and intercepts.* • *graphs of linear inequalities in both one and two dimensions.* • *simple quadratics and their graphs.* • *graphs of equations and inequalities that include absolute values.* • *constructing or interpreting matrices no larger than 5 x 5.*

Though the grade 10 Eligible Content lists more content than that included in the grade 8 content, some content is rephrased and repeated unnecessarily. "Investigate and solve linear and nonlinear equations and inequalities by creating tables, coordinate graphs, or number lines [and] directly solving equations and inequalities" is not very different from "Solve equations and inequalities numerically, graphically, and/or algebraically" and "Students will be asked questions that call for solutions of single variable equations and inequalities [and] graphs of one- and two-variable linear equations."

This repetition and lack of growth has at least two unfortunate consequences: First, the standards may not make enough choices about what is most important for students to learn and when; and second, the standards may appear to "stall" in middle school, thus underestimating what students are capable of achieving in middle and high school. Each consequence will be discussed in turn below.

3. The repetition of content across grades may lead some to believe that the Oregon standards are a "mile wide, inch deep."

As researchers for the Third International Mathematics and Science Study (TIMSS) found, repetition of content and skills is a common pattern in the United States; many state standards documents tend to repeat content from grade to grade, rather than differentiate expectations at each grade level. State standards also tend to include a lot of topics at each grade level — often covering them partially or superficially so that they have to be returned to again and again — instead of describing fewer key topics in greater depth. Some researchers believe that the lack of depth and focus in the American curriculum contributes to our students' poor performance relative to that of students in other countries, particularly in the middle grades and in high school.

In contrast, instruction in the top-achieving countries on TIMSS is focused on a smaller number of topics at a time, and these topics are treated thoroughly, until they are mastered. The top-achieving countries also make intentional choices about when concepts are introduced into the standards and when they disappear because students are expected to have mastered the content. Our review found that the Oregon standards do not always make such choices. Consider the following:

- Students in grades 3, 5, 8 and 10 are asked to round numbers (starting with one-, two- and three-digit whole numbers to the nearest 10, 100 and 1,000 in grade 3, moving to rounding with ranges from the nearest hundredth to the nearest ten-thousandth in grade 5 and the nearest thousandth to the nearest million in grade 8). Japan introduces the concept of place value in grade 3, when students are expected to understand the place value of 10,000 and completes the concept in grade 4, when students are exposed to "units such as hundred million, trillion, billion, etc."

- The geometry standards also repeat content. The Eligible Content bullets for grades 3, 5 and 8 are unnecessarily repetitive — in each of these spans, students are recognizing, identifying and measuring lines/line segments, angles, triangles, circles, quadrilaterals and other polygons. The Japanese standards ensure that students in grade 5 master these fundamentals before moving on to more advanced geometric content, such as solid geometric figures, planes in space and similarity, in grades 6 and 7.

Or consider the Oregon Number Theory standards for grades 5, 8 and 10. The Content Standards for these three levels read:

Grade 5
Use concepts of primes, factors, and multiples in whole number, fraction, and decimal operations.

Grade 8
Demonstrate the relationships among whole number, decimal, fraction, percent, exponent, and integer operations (including relationships involving ratio and proportion).

Grade 10
Apply the relationships among whole number, decimal, fraction, percent, exponent, and integer operations to solve problems (including relationships involving ratio and proportion).

These statements are written broadly, and the accompanying Eligible Content expectations may not provide enough detail for teachers to understand how the state differentiates the expectations for elementary school from those for high school.

Grade 5
Students will … recognize primes less than 100.

Grade 8
Students will … identify prime numbers less than 100.

Grade 10
Students will apply … prime numbers and prime factorization.

These standards comprise essentially the same mathematics lesson, the arithmetic of fractions and decimals, which arguably should be completed by grade 5 or 6, as they are in the Japanese curriculum.

Compare the Oregon geometry standards for the end of grade 8 with the following excerpts from the Japanese geometry standards for grades 5–8. The Japanese standards develop important content in each grade, thereby ensuring that by grade 8, students are doing more than just identifying various shapes and attributes of figures.

Oregon: Describe, analyze, and reason about the properties of two- and three-dimensional figures.

Grade 8 Benchmarks
Identify, classify, draw, and describe geometric figures. Visualize and represent geometric properties of two- and three-dimensional figures. Recognize, describe, and analyze geometric shapes and their functions in natural and constructed environments.

Eligible Content
Students will identify, measure, and visualize geometric figures and their component parts, including:

- Points, lines, planes, rays, vertices, segments, faces.
- Properties of parallel and perpendicular.
- Angles — right, acute, obtuse.
- Polygons.
- Types of triangles — right, acute, obtuse, scalene, isosceles, equilateral.
- Features of circles — radius, chord, diameter, tangent line.
- Solids — sphere, cylinder, pyramid, prism.

Students also will identify changes in area and volume in relation to changes in linear measures of figures.

Japan: Geometrical Figures

Grade 5
(1) Deepen understanding of fundamental plane figures through observing and constructing geometrical figures.
   a. Understand congruence of geometrical figures and the correspondence of vertices, sides and angles, etc. in congruent figures.
   b. Gradually pay attention to elements to determine shape and size of a geometrical figure.
   c. Investigate and construct geometrical figures by finding the simple properties of fundamental figures.
   d. Understand the meaning of the ratio of the circumference of a circle to its diameter.
   e. Draw regular polygons and investigate their fundamental properties by using circles.

Grade 6
(1) Further deepen understanding of plane figures.
   a. Understand the meaning of line and point symmetry, and consider the fundamental figures from the viewpoint of symmetry.
   b. Summarize understanding of shapes and size of the figures, and interpret and draw simple scale drawings.

(2) Deepen understanding of the fundamental solid figures through manipulation such as composition and decomposition.
   a. Know about the fundamental prisms and the circular cylinders.
   b. Know about the fundamental pyramids and circular cones.

Grade 7

(1) Develop abilities to insightfully construct figures that meet given conditions, and thereby deepen understanding of plane figures.
   a. Construct basic figures such as the bisector of an angle, perpendicular bisector of a line segment, perpendicular, etc.
   b. Translation, symmetry, and rotation.
   c. Consider a figure as a set of points that meet certain conditions and construct the figure.

(2) Consider geometrical figures through various manipulation and deepen their understanding of figures in space.
   a. Positional relations between straight lines and planes in space.
   b. Construction of solid geometrical figures by movement of plane figures.
   c. Section, projection, and development of solid geometrical figures.

Grade 8

(1) Find the properties of a figure in a plane, and confirm them by using the properties of parallel lines and the conditions for congruence of triangles.
   a. Properties of parallel lines.
   b. Conditions for congruence of triangles.
   c. Properties of triangles and parallelograms.

(2) Clarify the concepts of similarity of figures, and develop abilities to find the properties of figures by using the conditions for congruence or similarity of triangles and confirm them.
   a. Meaning of similarity and the conditions for similarity of triangles.
   b. Properties of ratio of segments of parallel lines.
   c. Applications of similarity.

Though there have not been international studies of literacy comparable to TIMSS, we have found that many states' standards for English language arts exhibit similar issues of repetition and lack of focus and mastery. Compare the Oregon English standards below with the excerpts from California's English standards, in which concepts are introduced in some grades, then focused on in other grades and then removed once students are expected to have mastered the concepts.

Common Curriculum Goals	Content Standard	Grade 3 Benchmark	Grade 5 Benchmark	Grade 8 Benchmark	CIM/ Grade 10 Benchmark	CAM/ Grade 12 Benchmark
Use a variety of reading strategies to increase comprehension and learning.	Locate information and clarify meaning by skimming, scanning, close reading, and other reading strategies.	Locate information using illustrations, tables of contents, glossaries, indexes, headings, graphs, charts, diagrams, and/or tables. *Students will:* • *use tables of contents and indexes to locate specific information.* • *use information in illustrations, graphs, charts and diagrams to help understand a reading passage.* • *use a glossary to locate words and/or help clarify word meaning.*	Locate information and clarify meaning by using illustrations, tables of contents, glossaries, indexes, headings, graphs, charts, diagrams, and/or tables. *Students will:* • *use tables of contents and indexes to locate specific information.* • *use information in illustrations, graphs, charts, diagrams, and tables to help understand a reading passage.* • *use a glossary to locate words to help clarify meaning.*	Locate information and clarify meaning by using tables of contents, glossaries, indexes, headings, graphs, charts, diagrams, and/or tables. *Students will:* • *use tables of contents and indexes to locate specific information.* • *use information in illustrations, graphs, charts, diagrams, and tables to help understand a reading passage.* • *use a glossary to locate words and/or help clarify meaning.*	Locate information and clarify meaning by using tables of contents, glossaries, indexes, headings, graphs, charts, diagrams, tables, and other reference sources. *Students will:* • *use tables of contents and indexes to locate specific information.* • *use information in graphs, charts, diagrams, and tables to understand a reading passage.* • *locate information from more than one area of a piece of supportive material such as a chart or find information in multiple materials, e.g., chart and index.* • *use a glossary to locate words and/or to help clarify meaning.*	Locate information, clarify meaning, and form conclusions by using tables of contents, glossaries, indexes, headings, graphs, charts, diagrams, tables, and other reference sources.

(table continued on p. 24)

Common Curriculum Goals	Content Standard	Grade 3 Benchmark	Grade 5 Benchmark	Grade 8 Benchmark	CIM/ Grade 10 Benchmark	CAM/ Grade 12 Benchmark
			• *use headings to locate where needed information is likely to be found.*	• *use headings to locate where needed information is likely to be found.*	• *use headings to locate where needed information is likely to be found.* • *find information in specialized materials, e.g., dictionary, thesaurus, atlas, encyclopedia, almanac, newspaper, magazine, catalog.*	

Contrast those standards with the following California standards for Research and Technology (an integral subsection found, depending on the particular grade level, in the standards for Writing Strategies, Writing Applications and Speaking Applications):

Grade 3

1.3 Understand the structure and organization of various reference materials (e.g., dictionary, thesaurus, atlas, encyclopedia).

Grade 4

1.5 Quote or paraphrase information sources, citing them appropriately.
1.6 Locate information in reference texts by using organizational features (e.g., prefaces, appendices).
1.7 Use various reference materials as an aid to writing (e.g., dictionary, thesaurus, card catalog, encyclopedia, on-line information).
1.8 Understand the structure and organization of (and use) almanacs, newspapers, and periodicals.
1.9 Demonstrate basic keyboarding skills and familiarity with the vocabulary of technology (e.g., cursor, software, memory, disk drive, hard drive).

Grade 5

1.3 Use organizational features of printed text (e.g., citations, end notes, bibliographic references) to locate relevant information.
1.4 Create simple documents using electronic media, employing organizational features (e.g., passwords, entry and pull-down menus, word searches, thesaurus spell checks).
1.5 Use a thesaurus to identify alternative word choices and meanings.

Grade 6

1.4 Use organizational features of electronic text (e.g., bulletin boards, databases, keyword searches, e-mail addresses) to locate information.

Grade 7

1.4 Identify topics; ask and evaluate questions; and develop ideas leading to inquiry, investigation, and research.
1.5 Give credit for both quoted and paraphrased information in a bibliography using a consistent and sanctioned format and methodology for citations.
1.6 Create documents by using word-processing skills and publishing programs; develop simple databases and spreadsheets to manage information and prepare reports.

Grade 8

1.4 Plan and conduct multiple step information searches using computer networks and modem-delivered services.
1.5 Achieve an effective balance between researched information and original ideas.

4. In mathematics, when compared with the benchmark standards — Arizona and Japan — the Oregon standards often underestimate what students are capable of learning at particular grade levels.

In general, Achieve's experts found that Oregon's mathematics standards are less rigorous than those of the benchmark documents. This is due primarily to the fact that Oregon's standards introduce content later than the benchmark documents, particularly in mathematics, and consequently, the standards for high school students are below what the benchmark standards expect of students in these grades. For example:

- At grade 3, Oregon students are expected to add and subtract with three-digit numbers; Japanese students are using all four operations on larger whole numbers.
- Oregon does not expect addition or subtraction of fractions until grade 5, when students add and subtract fractions with *like* denominators; Japanese students are adding and subtracting decimals and fractions with *unlike* denominators at grade 3.
- Japanese students must know about types of triangles and about the center, diameter and radius of a circle in grade 3; the Oregon standards expect students at the same grade to recognize and describe triangles within the context of sorting, classifying and describing shapes. Circles and their attributes are not mentioned specifically.
- At grade 8, students in Oregon are asked to apply measurement formulas that are addressed by Japan in grades 4 and 5. Grade 6 is the last grade for which Japan mentions units of measurement. In general, Japan does not emphasize measurement to the extent that Oregon and other U.S. states do. In fact, in Japan, standards for measurement are phased out after grade 5.
- Japanese students must solve linear equations with one variable in grade 7 and simultaneous equations with two variables in grade 8. Oregon's standards at grade 8 state that students will "investigate and solve linear and nonlinear equations … ." Oregon specifically addresses linear equations with one and two variables in grade 10.
- At grade 3, Arizona includes addition and subtraction of commonly used fractions and decimals; Oregon does not address this until grade 5.
- Arizona mentions median and mode in grade 3; Oregon first does this in grade 5.

- At grade 5, Oregon expects students to multiply two-digit numbers and divide three-digit numbers by a one-digit number. Arizona expects students to multiply and divide three-digit numbers by two-digit numbers.
- Arizona and Japan mention calculating the surface area of three-dimensional objects at grade 8; Oregon addresses this at grade 10.
- The Oregon standards do not mention formal proofs; the Japanese document asks students to understand the term "proof" as early as grade 8.
- Oregon students study least common multiple and greatest common factor in grade 10, while Arizona students cover this in grade 8.
- Oregon grade 10 students "will round to estimate answers to calculations." Japanese students cover this in grade 4, and then the standards do not mention this again.
- Oregon students study ratios and proportions in grade 10, while Japanese students cover direct and indirect proportion in grade 6.
- Oregon's Problem-Solving strand contains the identical items for each benchmark year, without differentiating the kinds of reasoning and problem-solving skills that are developed in elementary school versus those developed in high school.

5. Important expectations for early literacy, algebra and geometry are described inadequately and could be more demanding.

When compared to the benchmark standards, this important content in the Oregon standards is not covered as fully or with as much depth and rigor. Given the importance of providing sufficient guidance on effective strategies for teaching children to read, and given that algebra and geometry are gatekeeper courses for college entrance and completion, this subject matter deserves special attention in all states' standards.

Early Literacy Standards

Achieve's group of bipartisan experts agree on a number of key points regarding literacy expectations for students in grades K–3. In recent years, a consensus has emerged among literacy experts that the most effective strategies for teaching students to read couple high-quality instruction in phonics (e.g., decoding, phonemic awareness) with rich and varied exposure to literary experiences. Teaching phonics skills well should in no way detract from independent reading, reading comprehension, appreciation of literature or writing.

Because students' learning in the early grades progresses exponentially, the differences between what kindergartners and second graders know and are able to do is substantial. For these reasons, our experts believe that standards for K–3 should be delineated grade by grade and that they should be fairly explicit about the kinds of strategies educators should use to teach young children to read, write, listen and speak. Our experts identified North Carolina and Texas as exemplars in the area of early literacy; both states' standards are delineated grade by grade for these important years, and both value intensive phonics instruction combined with the study of challenging and relevant literature and strong writing opportunities.

Our experts considered the points above and compared the Oregon English standards for the end of grade 3 with the North Carolina and Texas standards for kindergarten through grade 3. They agreed that the Oregon standards are insufficiently specific and do not reflect what research has demonstrated to be the most effective way of delivering early reading content knowledge and skills. The standards do not reflect the findings of reading research on the important relationships among phonemic awareness, word recognition, fluency and comprehension. Content in a number of areas should be specified in more detail and should represent a progression of skill development from year to year.

For example, our experts pointed out missing content in the following areas:

- Phonemic awareness, decoding and spelling (including sound-symbol, syllable and morpheme knowledge to support the development of independent word analysis)
- Sight words and specific spelling patterns
- Grammar
- Syntax
- Difference between word decoding and word meaning
- Text organization
- Penmanship

The grade 3 Content Standard, Benchmark and Eligible Content expectations related to strategies for learning to read are worded too broadly to provide adequate guidance for educators. Consider the following:

Grade 3
Content Standard
Recognize, pronounce, and know the meaning of words in text by using phonics, language structure, contextual clues, and visual cues.

Benchmark
Determine meanings of words using contextual clues and illustrations.

Eligible Content
Students will:

- Use context clues to choose the correct meaning for given words on the state assessment.
- Use knowledge of common words in their compound or plural forms to help determine the meaning of words in the passage.
- Use illustrations such as pictures, charts, graphs, or diagrams to help determine the meaning of words in the passage.

The Eligible Content expectations are not developed fully or completely. In contrast, the Texas Reading/Word Identification standard is much more specific:

Grade 3
The student uses a variety of word identification strategies. The student is expected to:

A. Decode by using all letter-sound correspondences within a word;
B. Blend initial letter-sounds with common vowel spelling patterns to read words;
C. Identify multi-syllabic words by using common syllable patterns;
D. Use root words and other structural cues such as prefixes, suffixes, and derivational endings to recognize words;
E. Use knowledge of word order (syntax) and context to support word identification and confirm word meaning; and
F. Read both regular and irregular words automatically such as through multiple opportunities to read and reread.

Moreover, consider the following grade 3 spelling standards for each state:

Texas	Oregon
Grade 3 1.20 Writing/spelling. The student spells proficiently. The student is expected to: A. Write with more proficient spelling of regularly spelled patterns such as consonant-vowel-consonant (CVC) (hop), consonant-vowel-consonant-silent e (CVCe) (hope), and one-syllable words with blends (drop) (1-3). B. Spell multi-syllabic words using regularly spelled phonogram patterns (3). C. Write with more proficient spelling of inflectional endings, including plurals and past tense and words that drop the final e when such endings as -ing, -ed, or -able are added (3). D. Write with more proficient use of orthographic patterns and rules such as oil/toy, match/speech, badge/cage, consonant doubling, dropping e, and changing y to i (3). E. Write with more proficient spelling of contractions, compounds, and homonyms such as hare-hair and bear-bare (3). F. Write with accurate spellings of syllable constructions such as closed, open, consonant before -le, and syllable boundary patterns (3-6). G. Spell words ending in -tion and -sion, such as station and procession (3). H. Use resources to find correct spellings, synonyms, or replacement words (1-3).	*Grade 3* Common Curriculum Goal: Demonstrate knowledge of spelling, grammar, punctuation, capitalization, paragraphing, and citing sources. Content Standard: Use correct spelling, grammar, punctuation, capitalization, paragraphing, sentence construction, and other writing conventions. Benchmark: Demonstrate some control of correct spelling, grammar, punctuation, and capitalization. Spelling: Students will: • correctly spell words appropriate to grade level. • limit use of phonetic spelling to uncommon or difficult words.

ALGEBRA AND GEOMETRY EXPECTATIONS

Recent research from The College Board and the U.S. Department of Education confirms what parents, students and teachers have known anecdotally for some years: Completing rigorous and meaningful algebra and geometry courses in high school is a primary indicator of college success. To prepare all students for this now-essential content, state standards must lay the foundation early enough and provide depth and rigor throughout the grades.

The following discussion points out some strengths and some areas that, if addressed, would improve the Oregon standards for algebra and geometry.

Primary grades

- Algebraic Relationships (here called Functions, Relations and Equations): Our experts noted that there is exceptional detail regarding patterns that is not apparent elsewhere.
- Geometry: The bulleted items for geometry list shapes with which students should be familiar but omit discussion of position (above, next to), key attributes (a triangle is a triangle if it is closed and has three straight sides regardless of its size or orientation) and exactly what students are expected to do with the transformations of shapes they are to use. In addition, there is no mention of formulas or the conceptual development of formulas for area, volume or surface area at the grade 5 benchmark, where our experts think this content should be introduced.

Middle grades

- Algebraic Relationships: This strand is not specific enough, and our experts noted that the fundamentals of algebra are underemphasized in this grade span. There is no explicit expectation that students are writing equations of lines and other functions to describe and represent data. This is hinted at in the Eligible Content section of the test specifications but needs to be more prominent if it is to match up to the benchmark documents.
- Geometry: Our experts applauded the statement that "students will identify changes in area and volume in relation to changes in linear measure of figures," but noted that such valuable activities were few and far between; in general, students are expected to memorize routine facts.

High school

- Algebraic Relationships: Although the Algebraic Relationships strand is more specific and grounded in real content than many of the other high school strands (and includes solving a variety of equations), no mention is made of simplifying algebraic expressions. In addition, the concept of function transformation, an excellent way to link several areas of mathematics and increase student understanding of functions, seems to be missing.
- Geometry: Our experts noted that excessive attention is paid to nomenclature of geometric objects at the expense of mathematical reasoning. No mention is made of circle/angle/segment relationships. No clear mention is made of deductive reasoning, axioms, proof of the Pythagorean Theorem or formal proofs. Our experts were unsure of what to make of "develop conjectures and arguments to discover or verify the prop-

erties of figures" (grade 10), saying it seems either overly ambitious or an example of inflated language that may imply more than actually is expected of students. On the plus side, at grade 10, the Cartesian system is mentioned.

- Measurement: In high school, no discussion of precision or accuracy that would be relevant at grade 10 is included. Demand for right angle trigonometry is slight. A real course in algebra and trigonometry is not precluded by these standards, but neither is repetition of grade 5 expectations at this level.

6. Our experts noted a few other areas that are incomplete when compared to the benchmark standards.

The following areas may need to be addressed in subsequent revisions to the Oregon standards. The accompanying technical report provides more detail on each of these findings and includes comparisons to the benchmark standards.

ENGLISH

- The quality and complexity of the literature and texts that students should read are not described adequately in the standards.
- The state assesses students' understanding of literary, informational and practical texts on the assessments and separately describes the different skills and strategies needed to comprehend these texts, but these standards could be more specific and more challenging.
- Vocabulary study could be more explicit.
- The quality and complexity of writing that students should produce is not described adequately.
- Research skills are not addressed systematically.
- Standards regarding grammar, usage and punctuation do not match the rigor of the benchmark states'.

MATHEMATICS

- Fractions: In the primary grades, fractions are not mentioned as representations of part of a group of physical objects or as numbers in their own right. In addition, the standards ask students to identify fractions "from pictorial representations" but omit the conceptual knowledge that would enable students to understand what a fraction is.
- Calculations and Estimations: The mathematics standards also assume calculator use early — by grade 3. The standards also may place an undue emphasis on the usefulness of mathematics and not enough attention on mathematical thinking and reasoning in its own right. "Order lists of up to five numbers …" is an inadequate expectation of students in grade 10. The grade 12 benchmark that speaks to identifying potential errors when using technology should be expected in earlier grades, especially given that students are expected to use calculators beginning in the earliest grades. No new estimation benchmarks appear at grade 10.

MAJOR FINDINGS: OREGON'S ENGLISH LANGUAGE ARTS AND MATHEMATICS ASSESSMENTS

The Oregon tests are constructed on the basis of the Oregon Teaching and Learning Standards, which include the Common Curriculum Goals, Content Standards and Benchmarks, and Eligible Content at grades 3, 5, 8, 10 and 12. The test specifications documents include Eligible Content and an Explanation, as well as example items, reporting categories and the percentage of items per category that must be on each test form.

Achieve's analysis of the alignment and quality of Oregon's assessments is designed to answer three important questions:

- **Does each assessment measure only content and skills reflected in the standards? Or, put differently, can everything on the test be found in the state standards?**
- **Does each assessment measure the full range of the content and skills in the standards? Or, is everything in the standards measured by the assessment?**
- **Overall, is each assessment sufficiently challenging for students?**

Achieve's review found that, on the whole, the assessments measure only content and skills found in the standards. However, the tests measure some of the knowledge and skills from the standards better than other knowledge and skills, and in many cases, the assessments are not as rigorous as they could be. The following discussion summarizes and explains the most important findings from the alignment study; more detailed descriptions are included in the accompanying technical report.

1. Oregon's assessments in English and math measure content and skills that are found in Oregon's standards.

The Oregon assessments for grades 5, 8 and 10 consistently measure the standards. On average, more than 84 percent of test items are strongly consistent with the content of the standards, and the remaining items are somewhat consistent. As a result, the state can feel confident that nearly everything covered on the tests can be found in the standards, and schools and students who have used the standards to guide curriculum and instruction should not be surprised by material on the tests. This finding is commendable; some other states' assessments are less closely aligned to the content and skills in their standards.

Reflecting this faithful alignment to the standards, Oregon's assessments contain a near-equal number of items measuring each major content strand, such as Measurement or Literature. However, this precise parsing of items per standard may inadvertently confound alignment with allotment. By following a strict allotment of items per strand, the state may be missing an opportunity to make choices about the relative importance of each strand at key grade levels. The standards themselves do not progress enough or grow over time and tend to describe the breadth of the major domains in each grade span; unfortunately, the tests reinforce rather than alleviate these problems.

The English assessments: All three reading assessments focus on content and skills laid out the standards. Overall, more than 92 percent of test items strongly measure *content* found in the standards, and more than 85 percent strongly measure *skills* found in the standards. The assessment items in both reading and writing are well crafted and technically sound. And in most cases, the challenge students faced in answering the questions stemmed from the content being assessed, rather than from extraneous factors such as the language of the item or unnecessary information.

Assessment of writing is a particular strength — the writing assessment effectively emphasizes the crucial elements of writing and the concept of writing as a process. To this end, students are given a choice of topics — all of which are of high quality (clear, straightforward and well defined). Students are granted three 50-minute sessions (but not a final time limit) during which they may draft, revise, edit and submit a final piece. They are permitted to use spellers, dictionaries or thesauruses, and each student is supplied with a guide to revision that explains what raters will look for when they score student papers. This same rubric is used to evaluate student papers; it is appropriately specific and sets clear expectations for students. In fact, Achieve's reviewers commented that the rubrics could be used to reframe the writing standards.

Importantly, each student's annual writing assessment is part of a larger collection of work that includes three classroom writing samples (two samples for grade 3) scored according to the same rubric as the sample provided on demand. Moreover, the whole collection, including the on-demand piece, must meet a predetermined composite score to be considered "passing." The use of classroom papers to supplement the writing conducted on demand as part of the statewide assessment is laudable: It enables the assessment to both transcend the limits of tasks required by statewide, large-scale assessments and emphasize all types of writing, including the narrative, expository and persuasive genres.

The mathematics assessments: Overall, the mathematics assessments are aligned fairly well to the content and skills laid out in the standards. On average, 75 percent to 80 percent of items on the three tests are clearly consistent with the *content* of the standards, and the remaining items are somewhat consistent with the content. Across the three tests, roughly 70 percent of items consistently measure the *skills* demanded by the standards.

Similar to the thoughtful writing program, Oregon has developed an effective way to include extended tasks in the math assessments and incorporate classroom work into the statewide assessment system. This is especially impressive because of the necessary time limits in a statewide test. If the state includes a large number of extended problems, it may get less overall information about student performance. On the other hand, if the state includes few such problems, it may reduce the opportunities for students to engage in more cognitively complex tasks.

In mathematics, Oregon has struck a balance by requiring students to complete one problem out of a given three on the statewide test. While requiring only a single problem may limit student opportunity to demonstrate proficiency, giving students the choice of three permits the state to combine results from the different problems and report results at the school level.

Just as important as the inclusion of open-ended math problems in the large-scale assessment is Oregon's decision to require classroom samples of student work aligned with the standards and evaluated according to the same criteria as the on-demand assessments. A checklist, which accompanies each grade's problem set, reminds the students what the raters will be looking for and explains the criteria (conceptual understanding, process and strategies, verification, communication, and accuracy). In an effort to increase rigor, the Calculations and Estimations strand is excluded from work sample categories approved for grade 8 and grade 10; the Measurement strand also is excluded at grade 10.

Oregon's approach is powerful: It provides students with additional opportunities to demonstrate competence in key subject areas, and it has the potential to affect teaching and learning significantly, since working on thought-provoking problems and writing in various modes blurs the edges among instruction, learning and assessment. Moreover, it makes clear to students, teachers and the larger public that the state and local assessments are complementary parts of the instructional system.

2. The assessments measure some of the objectives specified in the standards better than other objectives, thus covering the standards unevenly. In many cases, they tend to measure lower-level skills and knowledge and thus fail to measure some important benchmarks.

As noted above, the even distribution of items per content strand ensures that all the strands are represented by at least some items on the assessments. Unfortunately, the state appears to have achieved this breadth at the expense of assessing important concepts with depth. Also, the state constructed the tests by aligning items to the strands rather than the Eligible Content, so many key objectives found in the Eligible Content are not assessed at all.

Moreover, this problem is not restricted to the content that the assessments emphasize. When compared to the benchmark standards, the Oregon standards often focus on lower-level cognitive skills, such as "identify," and the assessments compound this emphasis by consistently measuring these skills at the expense of the more complex skills. Both in English and math, verbs such as "use," "identify," "locate," "recognize," "summarize," or just "read" and "write" or "compute" appear even at the upper grades with great regularity; this means that students may be asked to focus on restating or summarizing text rather than interpreting it in English or to focus on memorizing definitions rather than developing conceptual understanding in math.

For example, the grade 3 benchmark for geometry states that students will "sort, classify, and describe shapes." It does not ask them to demonstrate an understanding of their key attributes. Thus, a student could meet the standard by identifying a rectangle but not necessarily knowing, for example, that it contains four right angles.

In addition, many of the objectives found in the Eligible Content comprise compound performance expectations — usually, the first verb indicates a lower-level cognitive skill, and the second verb signifies a more complex skill (e.g., "recognize and analyze …"). For example, in English, a grade 8 expec-

tation in the Literature strand is: "Identify literary devices such as figurative language … and determine the purpose of their use …" Or consider the following from grade 10: "Identify the purpose of literary devices … and determine their impact." A grade 8 math Benchmark in the Algebraic Relationships strand asks students to "Recognize, create, describe, and analyze patterns and sequences," while a grade 10 benchmark in the same strand requires students to "determine and interpret maximums, minimums, and zeros of functions."

In a significant number of instances, only part of a compound objective is addressed in the test, and it is usually the less cognitively demanding part. The result: Throughout these assessments, the more cognitively challenging skills are underassessed.

The English assessments: This tendency to demand less of students, rather than more, is pervasive in the reading assessments. For example, grade 10 students are asked to "Identify the purpose of literary devices … and determine their impact on a selection," but a number of items require students only to identify the purpose — or simply identify the device. Or, one question on the grade 5 test asks students to identify which of the four answer choices is an example of dialogue but does not ask students to determine why the author has chosen to use dialogue or what impact the dialogue has in the selection.

In addition, the assessments consistently emphasize certain objectives found in the Eligible Content at the expense of others. For example, at grade 5, two of four bulleted objectives for the Benchmark, "Locate information and clarify meaning … ," are not addressed at all. While an objective under the Benchmark for literal comprehension that calls for identifying directly stated facts is deserving of some emphasis, many related items focus on minutiae rather than on important information. Two-thirds of the items address this objective, but none addresses the objective calling for identification of a passage's main idea — a critical skill that should be assessed at grade 5.

On the grade 8 test, several items assess the Benchmark, "Examine relationships, images, patterns or symbols to draw conclusions about their meanings in printed material." However, one of the related objectives, "Infer an author's unstated intention(s) or meaning by drawing conclusions from images, patterns, or symbols in the text," is overrepresented at the expense of two other, more challenging objectives, "Examine implicit relationships such as cause and effect …" and "Predict probable future outcomes or actions."

In grade 10, all items related to the Benchmark, "Identify sequence of events, main ideas, facts, supporting details, and opinion in literary, informative, and practical selections," measure the objective that targets "directly stated facts." While some items arguably could be mapped to the objective calling for supporting details, the remaining objectives concerned with sequence, main idea and opinions are unassessed.

Items related to the Benchmark concerned with the effect of character, plot, settings, theme, literary devices and stylistic decisions are more balanced but could be adjusted further. Most items are linked to the objective calling for students to identify the purpose of literary devices, but theme is underrepresented. The objective addressing the use and effect of dialogue is not assessed at all. And the portion of the overall standard calling for students to interpret and explain a literary work also is not assessed.

The mathematics assessments: There are similar patterns in mathematics. Test developers had substantial success in covering the five major strands evenly. However, within each strand, key concepts and skills are underrepresented, while other content is overassessed. Of all the strands, Statistics and Probability standards found in the Eligible Content are the only concepts assessed evenly across the three grade levels.

In the grade 5 test, for example, "ordering items," "primes" and "factors" are overrepresented, while important concepts like "negative numbers" and "percentages" are underrepresented. Conceptually focused objectives (such as "Identify correct operations for solving word problems," "Interpret pictorial representations of percents," and "Recognize … number theory concepts …") are not represented at all. Objectives that address higher-level cognitive skills, such as "Understand and apply the concept of division of a surface into unit squares … and of a rectangular solid into unit cubes" and "Solve a variety of word problems with monetary amounts …" are not assessed at all. Similarly, more than half of the measurement items at grade 5 focus on measuring length. More than half of all measurement items ask for an estimate, and none asks that students measure quantities directly. However, neither of these strong emphases is implied or stated in the standards.

At grade 8, there are important imbalances in the set of items measuring Geometry. Three-dimensional shapes are underrepresented, and the most conceptually oriented and cognitively demanding objectives, "Identify changes in area and volume in relationship to changes in linear measures of figures" and "Use geometric diagrams and models to solve problems" are either not assessed or not assessed well (i.e., the single item related to the latter objective does not in fact require problem solving).

The set of items assessing Measurement also has significant omissions. Students are not asked to find the perimeter or area of irregular polygons — in fact, area is not assessed at all. As with the grade 5 assessment, students are not required to measure quantities directly, even though they have access to tools such as rulers during the test.

In contrast, the set of items measuring Algebraic Relationships is better balanced. There is a good variation in items concerned with representing relationships, and both linear and nonlinear functions and inequalities are included. This is a significant strength of the grade 8 test.

At grade 10, in general, item sets for the strands do not have the same emphasis on the content and performances found in the standards. For example, and in contrast to the algebra items on the grade 8 test, there are two concerns with the set of items mapped to algebra. First, although multiple representations and translations among such representations are called for in the standards, there is a lack of coordinate plane graphing of functions. Second, the Benchmarks also call for students to "Recognize and distinguish among linear, quadratic, and exponential functions" and "Determine and interpret maximums, minimums, and zeros of functions," yet neither benchmark is assessed.

Geometry has three items mapped to "Use geometric models and properties of figures (e.g., Pythagorean Theorem) to solve problems," but none directly assesses the Pythagorean Theorem. And the more cognitively demanding objectives related to Statistics and Probability (i.e., "Solve problems using various strategies for making combinations and/or permutations" and "Determine appropriate designs for simulations") are not assessed.

3. Overall, the assessments are not sufficiently challenging. The reading tests contain challenging reading passages but do not take advantage of them. The math tests are not rigorous enough for the given grade levels and, in some cases, are less rigorous than the standards.

Achieve's experts noted that the assessments are not as rigorous as they could be. In particular, the tests sometimes seem to have missed opportunities to assess students' understanding of key concepts and are not always appropriately challenging for the given grades.

The English assessments: In English, our reviewers found that the passages used to assess the reading and literature standards are quite good: They are suitably rigorous for each grade level, they have various lengths, they are interesting to read, and many feature Oregon authors and situations. In particular, reviewers praised "Epiphany" at grade 8 and the poetry selection at grade 10.

However, the items do not always take advantage of the richness of the texts by delving deeply to ask challenging questions. This finding is especially evident in the questions related to informational texts; such items typically ask students merely to identify and recall information directly from the passage rather than use that information to analyze or draw conclusions.

While the standards do not show increasing progression in terms of cognitive demand, the tests do become more challenging over time (in contrast to the mathematics assessments). That said, the tests do not grow as much as reviewers believe necessary.

Reviewers found that each of the tests contains sets of items where the level of challenge is too low. In grade 5, the set of questions mapped to the Benchmark, "Determine meanings of words using contextual and structural clues, illustrations, and other reading strategies" is too easy; in grade 8, items assessing the Benchmark, "Read a variety of literary works and distinguish among characteristics of a variety of literary forms …" are not challenging enough for students at this level. This is especially disappointing considering the richness of many of the passages on this test.

And in grade 10, the Benchmark for comprehending informational text calls for students to locate information and clarify meaning using a variety of reference sources. In general, the related items ask students to perform low-level tasks — locating information on a chart, for example, in lieu of comparing or analyzing information. Although requiring students to use a graph is a good addition to this section, for the most part, the items represent a missed opportunity to assess critical skills with a greater degree of rigor.

The mathematics assessments: Achieve's reviewers did not see a progression of concepts and skills from grade 5 to grade 8 to grade 10. The tests' overall rigor actually decreases from grade 5 to grade 8 to grade 10, with the grade 10 exam being quite weak.

Moreover, the level of challenge of item sets tends to be inconsistent among strands. In other words, some standards are assessed with more challenging item sets than are others. Of the five strands, items measuring Algebra are the most evenly distributed in terms of difficulty, while Geometry has the narrowest and least satisfactory distribution, with items clustering at the low end of challenge. Overall, there is a tendency to assess the less demanding content.

At grade 5, the level of challenge is somewhat unsatisfactory for the set of items mapped to Calculations and Estimations. The standards often state a purpose not reflected in the items themselves (e.g., "round calculations" or "use concepts … in operations"). The level of challenge for Geometry is also disappointingly low, with items in the main calling for definitions of terms rather than conceptual understanding or application. This may stem from the way in which the standard itself is formulated.

Rigor varies from item set to item set at grade 8. Items assessing algebra are strong and include a nice distribution of difficulty in the items. For Calculations and Estimations, items requiring students to estimate were found to have a low level of challenge; of the remaining items for this Benchmark, few were challenging. Again, geometry items were pitched well below what the reviewers would have expected for students at this grade.

Overall, the grade 10 exam is not as rigorous as it should be for students expecting to earn a Certificate of Initial Mastery. A number of items are actually easier than corresponding items from the tests for grades 5 and 8. In particular, the items assessing Calculations and Estimations, Measurement, and Probability are not as challenging as they should be. Happily, the algebra and geometry item sets are appropriately rigorous for grade 10; this will send meaningful signals to students and schools about the importance of these two subjects.

RECOMMENDATIONS FOR MOVING FORWARD

Oregon has taken substantial steps to develop and implement a standards-based system of education. The state has adopted content standards in core subjects and has committed to refine these continuously. The state has put in place assessments that are aligned to the standards and has developed a nicely complementary system for producing and analyzing classroom work. The state also is at the forefront among all states in attempting to make standards matter for students by tying college admission to the high school standards.

ACHIEVE RECOMMENDS THAT OREGON:

✓ **Combine the strengths of the standards and the test specifications into a new document that makes choices about what is most important for students to learn and provides explicit guidance to educators and the public about what is expected.**

In creating such a document, Oregon will have much to draw on, starting with the current standards and the test specifications documents, as well as the benchmark standards we used in our analysis, the learnings from the Third International Mathematics and Science Study, the National Assessment of Educational Progress, and recent research on early literacy from the National Institutes for Child Health and Development and the National Research Council.

The Oregon Department of Education has indicated its interest in developing frameworks that will provide expectations for each grade to clarify and supplement the state standards. We believe this is an excellent opportunity for the state to:

- Streamline the standards' organizational structure by eliminating the largely redundant Curriculum Goals and Content Standards and focusing on and fleshing out the Benchmarks and Eligible Content.
- Make choices about what is most important for students to learn at each grade level and outline a thorough and challenging progression of content knowledge and skills through the grades.
- Raise the overall expectations in the standards by increasing the level of rigor and the depth of knowledge and skills demanded of students.
- Pay special attention to the gaps our review uncovered in the areas of early literacy, algebra and geometry.
- Supply more detail and clarity for teachers in every grade so that each teacher knows what it will take to prepare students for the state assessments in grades 3, 5, 8 and 10 and the Proficiency-Based Admissions Standards System exams.
- Reinforce the state's notion of an aligned local classroom → school → district → state system.

Other states have developed new documents that successfully describe the essential content and skills that will be measured on the state assessments. If Oregon produces a new set of materials, it will be key to make sure that the documents receive prominent attention among Oregon citizens, that they are the primary documents used by educators to plan standards-based instruction, and that they are the primary communicator of the content and skills assessed on the state tests. In our view, the new materials will not be successful if they are viewed as one of several optional documents produced by the state. The frameworks will require mass distribution to all teachers and administrators; the same efforts will be needed to make Oregonians aware of the state's expectations for student learning that led to the distribution of 100,000 copies of the latest standards. The state may want to consider developing a parents' version of the frameworks as well.

✓ **When the next generation of assessments is developed, revise the assessments to address the issues this study uncovered.**

In our view, the concerns noted above with the standards require more immediate attention, and the state may consider waiting to revise the assessments until after the frameworks have been developed, vetted widely and implemented in classrooms.

When the state turns its attention to developing the next generation of standards-based tests, it will be key to:

- Align tests closely to the specific content knowledge and skills laid out in the new frameworks.
- Assess the depth of the standards as well as their breadth by measuring cognitively demanding concepts in addition to foundation skills.
- Ensure that the assessments' rigor matches that of the frameworks and that the assessments grow more rigorous as children grow older.

As Oregon moves forward to improve its standards and assessments, we encourage state leaders to communicate to all Oregon citizens, and especially educators, that continuous improvement does not mean a total change in direction or a change in the course of reform. Oregonians need to understand that the state is committed to standards-based reform for the long term and that it is not a passing fad, something we know state officials have articulated well in the past. At the same time, people need to understand that the expectations for students and schools must grow and evolve over time, so that Oregon's students are prepared for the challenges of a world that is changing rapidly. Standards are here to stay in education, but they cannot remain stagnant, and they must be communicated clearly and continually to schools and the public.

We at Achieve are grateful for the cooperation and support Oregon officials provided to enable us to conduct this analysis. We hope that the information we have provided in this report and in the accompanying technical report is helpful to Oregon as the state continues to work toward a higher-performing and more accountable education system.

ACKNOWLEDGMENTS

From preparing to benchmark Oregon's standards to analyzing the standards and assessments to putting together this final report, Achieve relied on the expert assistance and input of many individuals and organizations. For their assistance with different aspects of the process, Achieve would like to thank the following individuals for their assistance with this project:

- **Joanne Flint, Joyce Benjamin Holmes,** and **Duncan Wyse** for their assistance with this project.
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- **Kaye Forgione** of the Council for Basic Education for assistance in many capacities throughout the project.

We also are grateful to the following individuals who took time out of their busy schedules to make presentations to teams of state policymakers at our summer institute in Keystone, Colo.: **Adam Kernan-Schloss,** A-Plus Communications; **Jo Ann Norris,** Public School Forum of North Carolina; **Bill Porter,** Partnership for Learning; **Lauren Resnick,** Learning Research and Development Center, University of Pittsburgh; **The Honorable Roy Romer,** former governor of Colorado; **Bill Schmidt,** Michigan State University; **John Stevens,** Texas Business and Education Coalition; **Ron Wolk,** *Education Week*.

APPENDIX

SELECTING BENCHMARK STANDARDS

In preparing to benchmark Oregon's standards, Achieve asked 10 respected experts to examine several sets of exemplary standards documents. The original sets of standards the experts examined in English language arts and mathematics were:

ENGLISH LANGUAGE ARTS
California content standards
Massachusetts curriculum framework
NAEP* reading framework
NAEP writing framework
New Standards performance standards

MATHEMATICS
Arizona content standards
Delaware content standards
Japan curriculum framework
NAEP framework

From these documents, Achieve benchmarked Oregon's standards against those of California and Massachusetts in English and Arizona and Japan in mathematics. In later stages of this work, Achieve acted on additional expert advice and used the K–3 early literacy standards from North Carolina and Texas as well.

The content and standards experts who participated in the analysis of these documents were:

ENGLISH LANGUAGE ARTS
- Sheila Byrd, education consultant
- Carol Jago, high school English teacher, Santa Monica High School; director, California Reading and Literature Project, UCLA
- Louisa Moats, project director, NICHD Project; Clinical Association professor of pediatrics, University of Texas–Houston
- Sandra Stotsky, deputy commissioner of academic affairs, Massachusetts Department of Education
- Karen Wixson, dean and professor of education, University of Michigan

MATHEMATICS
- Lawrence Braden, mathematics teacher, St. Paul's School
- Susan K. Eddins, curriculum and assessment leader, Illinois Mathematics and Science Academy
- Ed Silver, senior scientist, Learning Research and Development Center, University of Pittsburgh
- Harold Stevenson, professor of psychology, University of Michigan
- Lucy West, director of mathematics K–12, Community School District Two, New York City Public Schools

Achieve also asked 15 experts in science, history, geography and civics to review several sets of exemplary science and history/social science standards. More information about these experts and standards is available upon request.

* National Assessment of Educational Progress

ACHIEVE'S BENCHMARKING CONSULTANTS AND EXPERTS

Achieve relied on nationally respected experts in academic content, standards, curriculum and assessment design to inform and conduct the standards benchmarking and alignment of assessments to standards.*

The experts and consultants who provided feedback on the Oregon standards were:

ENGLISH LANGUAGE ARTS

- Sheila Byrd, education consultant
- Louisa Moats, project director, NICHD Project; Clinical Association professor of pediatrics, University of Texas–Houston
- Susan Pimentel, co-founder, StandardsWork
- Sandra Stotsky, deputy commissioner of academic affairs, Massachusetts Department of Education
- Karen Wixson, dean and professor of education, University of Michigan
- Dennis Palmer Wolf, Hiatt Professor of Education, Clark University; senior researcher, Harvard Graduate School of Education

MATHEMATICS

- Diane Briars, assistant director of mathematics, Pittsburgh City Schools
- Susan K. Eddins, curriculum and assessment leader, Illinois Mathematics and Science Academy
- Curtis McKnight, professor of mathematics, University of Oklahoma
- Ralph Raimi, professor emeritus of mathematics, University of Rochester
- Harold Stevenson, professor of psychology, University of Michigan
- Norman Webb, senior research scientist, Wisconsin Center for Education Research, University of Wisconsin–Madison

Achieve's assessment-to-standards experts and consultants who led and participated in the July 1999 summer training institute and the analysis of state assessments were:

ENGLISH LANGUAGE ARTS

- Sheila Byrd, education consultant
- Ellen Clark, education consultant
- Sue Craig, education consultant
- JoAnne Eresh, education consultant
- Eunice Greer, associate superintendent, Illinois State Board of Education
- Laura McGiffert, senior project associate, Achieve

MATHEMATICS

- Pam Beck, director, mathematics examinations, New Standards
- Diane Briars, assistant director of mathematics, Pittsburgh City Schools
- Kaye Forgione, director of academic standards programs, Council for Basic Education
- John Nicholson, vice principal of instruction, Frederick Douglass Middle School, Rochester City Schools
- Norman Webb, senior research scientist, Wisconsin Center for Education Research, University of Wisconsin–Madison
- Lucy West, director of mathematics K–12, Community School District Two, New York City Public Schools

* Detailed biographical information about Achieve's experts and consultants is available upon request.

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