Achieve, Inc.

MEMORANDUM

To: Chris Koch, Superintendent, Illinois State Board of Education
Susie Morrison, Special Assistant to the State Superintendent, Illinois State Board of Education

From: Michael Cohen, President, Achieve, Inc.
Matthew Gandal, Executive Vice President, Achieve, Inc.
Jennifer Vranek, Senior Consultant to Achieve

Date: May 13, 2008

Re: Illinois and ADP

We were pleased to be able to provide you with a review of your high school standards in English, mathematics and science with a particular eye toward their alignment with the knowledge and skills young people need to be ready for college and careers. While there are real strengths in the standards, there are also gaps—in some cases significant ones. The report on our review of the standards is enclosed.

When we spoke last month, you also expressed interest in having Illinois join the American Diploma Project Network (ADP) as part of your strategy for working with the higher education and business communities to better align expectations and increase students' readiness for college and careers. You asked for more information about the work Achieve does with ADP states so that information could form the basis for a 12-18 month plan of action. This memo and attachments outline our initial thoughts, which we will continue to refine after we visit with you, the State Board and other leaders May 21.

Joining the ADP Network

The ADP Network is a coalition of states that have committed to an ambitious policy agenda designed to better prepare students for successful transitions from high school to postsecondary education and the world of work. The Network has grown from 13 to 33 states since it was first launched at the 2005 National Education Summit on High Schools.

Joining ADP requires the commitment of leaders from four sectors—Governor, K-12, higher education and business—to work together on the ADP policy agenda of college- and career-ready academic standards, graduation requirements, assessments, data and accountability systems.

To officially join, leaders from these four sectors (as well as other key leaders whose participation can "make or break" the initiative's success) sign a letter to Achieve outlining their shared commitment and goals. We have attached recent letters from Connecticut and Tennessee as examples.

The next step would be to form the Illinois ADP Leadership Team. The most effective State Leadership Teams meet regularly to chart strategy, identify policy goals and options, create action plans, monitor progress and identify outreach needs. They identify a "lead coordinator/liaison" (often an associate or deputy superintendent) who is responsible for convening the team and moving the work forward. The Leadership Team also attends the annual Achieve ADP Leadership Team Meeting with their counterparts from other ADP states. This year's meeting will occur September 11-12 in Washington, DC.

The four sectors that join ADP also make up the typical Leadership Team—Governor, K-12 chief, higher education chief and business leader. Other states have strategically expanded their teams to include strong thought partners or major sectors. Additional members in other states have included the state board chair, a university president, a legislator, the director of the early education agency or workforce development agency, or the head of the high school principals association or other organizations critical to moving the reform agenda.

We encourage you to keep the Leadership Team relatively small—and engage other leaders and stakeholders in concentric circles outward from this team.

States have launched their ADP initiatives in various ways. Most have arranged a series of meetings with and presentations to stakeholders (such as statewide education associations, business organizations and grassroots coalitions) about ADP that may include Achieve staff. Many have also leveraged public announcements—such as press events, paper releases and/or meetings with reporters and editorial boards—to show that leaders across the sectors are joining together to address this critical issue.

We would be happy to talk through what team makeup and public launch strategy might make the most sense for Illinois.

Achieve's Alignment Institutes

If Illinois were to join ADP, we would recommend participating in our Alignment Institute as a first step. Achieve's Alignment Institutes are a strong vehicle for facilitating the kind of collaboration among K-12, higher education and business leaders that is needed to strengthen K-12 standards in the manner that you are interested in. Twenty states have been through this process with us over the past few years and nearly all have emerged with a very strong set of standards as a result. It has proven to be a very successful model.

Our goal will be to tailor the Alignment Institute to take into account your priorities and the activities you already have underway. Conceptually, the Alignment Institute process would take shape as follows:

Illinois' ADP Leadership Team would identify a group of 10-15 Institute participants. These individuals would be drawn from Illinois' K-12 and higher education sectors, as well as individuals from industries important to Illinois' economic future. The mix would include officials with oversight for academic standards and policies, faculty senate representatives and individuals from K-12, higher education and business with deep subject matter expertise.

Achieve would work closely with this team in summer 2008 to plan the Institute. The process would formally commence in October with a two-day meeting at a location outside the state to review Achieve's analysis of the state's standards, learn about successful postsecondary and business outreach processes in other states and create a work plan and timeline for action. Two additional out-of-state meetings would occur over the following 12-15 months to review progress and finish execution of the plan.

In Illinois' case, the Institute plan might address: Outreach to postsecondary and business leaders to identify skills critical for all Illinois students to successfully transition to college and careers; filling in gaps in the high school standards to align with those college and career ready standards; adjusting the preK-8 standards as necessary to vertically align with the high school standards and college- and career-ready standards; and aligning the PSAE and ISAT with the revised preK-12 standards.

More detailed information on the Alignment Institute is attached. We are presently in discussion with leaders from California and Florida about participating in the same cohort of the Alignment Institute. California and Florida leaders would be focused on alignment within their states, but there would be significant opportunities for cross-fertilization and thought partnership with those states around shared challenges.

Reviewing and Aligning the preK-12 Standards and State Assessments
You asked us whether we could review the Illinois preK-8 academic standards and help the state “vertically align” its elementary, middle and high school standards with the college- and career-ready expectations. Achieve already has produced model course descriptions and benchmarks specifying what students should know and be able to do beginning in elementary school to culminate in college and career readiness by the end of high school. We are prepared to think through with you how those “back-mapped” standards and your new college- and career-ready standards could be used to review your preK-8 and high school standards and how that work could be incorporated into the alignment institute process described above.

In addition, once the state has addressed the gaps in its standards, the next step is to look at the alignment of the new back-mapped preK-12 standards with ISAT in 3-8 and PSAE in high school.

Both of these activities would require additional levels of analytic work for Achieve, so we will need to think through the capacity and timeline implications of adding vertical alignment of standards and alignment of assessments to the Alignment Institute work plan. Please see the attached memo for more on these issues.

Costs
There is no cost for joining ADP but the alignment services are provided on a fee-for-service basis. The budget would need to be based on the ultimate scope of work agreed upon by the state and Achieve.

Notwithstanding the up-front investment, better systemic alignment will likely stimulate savings in the near-term and certainly in terms of downstream costs. And Illinois’ participation in the Alignment Institute would be a powerful way to deepen the commitment and momentum among the state’s leaders to advancing college and career readiness.

* * *

Achieve is prepared to do everything we can to help you move Illinois ahead. We look forward to discussing these ideas with you and seeing you in person on May 21.

Achieve, Inc.
American Diploma Project Network

Achieve Alignment Institute 2008-09 – Illinois Overview

The Illinois State Board of Education requested that Achieve analyze the Illinois Stage I (Grades 8, 9, 10) and Stage J (Grades 11, 12) Performance Descriptors in English and mathematics and compare them to the ADP Benchmarks for English and mathematics. A preliminary report delivered in February 2008 and a final report delivered in May 2008 indicate that there are significant gaps in alignment with the skills and knowledge that college faculty and employers say is essential for student success. Participation in the Achieve Alignment Institute can be a powerful strategy for bringing the K-12, higher education and business communities together to define college and career ready expectations for Illinois high school graduates. These expectations will serve as an anchor for the alignment of the state's K-12 standards with the actual preparation students need for their next steps into postsecondary and the workforce.

Goal: Identification of Illinois' College and Career Ready Standards

The Achieve Alignment Institute is designed to help Illinois identify College and Career Ready Standards that are co-owned and mutually endorsed by K-12, postsecondary, and business. Achieve will customize the Alignment Institute and create a process with the Illinois team to identify the English and mathematics expectations that are most critical for high school graduates to:

- Enter into credit-bearing coursework in two- or four-year colleges, without the need for remediation and with a strong chance for earning credit toward their program or degree; and
- Gain entry-level positions in quality job and career pathways, which often require further education and training.

Additional analyses may be done for Illinois' ADP Leadership and Alignment Teams to better understand how existing assessments like the PSAE will align with the College and Career Ready Standards that are identified. The goal is for Illinois' high school students to have an accurate view of the preparation they may still need in order to graduate college and career ready and ensure successful placement in entry-level, credit bearing college coursework.

When Illinois has identified the College and Career Ready Standards, the next critical step for the state would be to evaluate and "vertically align" Illinois' Learning Standards in English Language Arts and mathematics for K-8. Achieve could provide analyses of the current Illinois K-8 standards in English and mathematics as a basis for this work. These analyses would indicate where gaps might occur in the progression of knowledge and skills that build students' preparation for college and work.

Illinois' Cross Sector Team

In order to participate in the Achieve Alignment Institute, Illinois will put together an alignment team consisting of leaders and experts from the K-12, higher education, and business communities. The make-up of the team varies across the three meetings of the Alignment Institute depending upon the agenda and input/expertise needed (see Attachment A). Collaboration among the members of the state team will be critical to the alignment effort. States have found that various types of expertise and broader engagement result in high quality College and Career Ready Standards that are co-owned and supported across the sectors.

Members of the alignment team will engage in careful analysis and dialogue to identify the core knowledge and skills mutually verified and endorsed by:

- State postsecondary institutions as defining the knowledge and skills necessary for placement into credit-bearing courses;
- Employers and the business community as constituting skills necessary to enter and succeed in the 21st century workplace; and
- Leaders of K-12 including the state board of education or other appropriate governing body as defining the core knowledge and skills in English and mathematics that all students need in order to successfully transition from high school to college and careers.

Achieve Provides Support

- Convenes the state alignment team three times over a one year period
- Provides technical assistance, training, tools and coaching
- Provides comparisons of various state expectations, national benchmarks
- Reviews preliminary and final drafts of College and Career Ready Standards

Costs

Basic Support

A basic fee would be charged to cover:

- Lodging, meals and materials for the members of the State Alignment Team during the actual times all states are scheduled to meet (October 2008, March and July 2009)
- The initial, preliminary, and final analyses of drafts of Illinois' College and Career Ready Standards that will be shared during the institute sessions.
- On-site technical assistance during Institute sessions and interim state visits to state (as needed) by Achieve staff.
- (Please note: Air and ground travel costs for the State Alignment Team members to and from Institute Sessions are not covered.)

Additional Analytics

Illinois will be able to request additional analyses such as:

- How the PSAE, a college readiness exam used within the state, aligns with the college and career standards identified by the Illinois' team.
- How the current Illinois' Learning Standards in English Language Arts and mathematics for K-8 "vertically align" with the College and Career Ready Standards that are drafted as part of the alignment process. These analyses would indicate where gaps might occur in the progression of knowledge and skills that build students' preparation for college and work.

Other customized analyses may also be designed as needed by Illinois. The Basic Support Fee for the 2008-09 Cohort has not yet been set and the final budget for Illinois' participation in Cohort IV of the Achieve Alignment Institute would be based upon the ultimate scope of work agreed upon by the state and Achieve.

Timeline of Achieve Alignment Institutes and Illinois' Activities

Generally, states have taken a period of 12-18 months to complete the process of identifying College and Career Ready Standards that are co-owned and mutually endorsed by K-12, postsecondary, and business. Progress depends on the extent to which the team can build on current state efforts – specifically on the existing high school standards and any postsecondary efforts to identify entry-level standards. Legislative and Board priorities also influence progress. An approximate timeline for the 2008-09 Alignment Institute of Cohort IV States follows.

May – August 2008

Achieve team visits Illinois to:

- Learn about the state's priorities and critical timelines (e.g. Illinois College and Career Ready Standards, alignment of the PSAE with these standards, ensuring vertical alignment K-12 to better prepare students for college and careers) and how these priorities will be integrated into the Alignment Institute State Plan
- Begin planning overall alignment process to address various state priorities (for example, discuss documents needed for analysis and timelines for submitting documents)
- Prepare for first institute with the Alignment Team Coordinator and other key individuals from K-12, postsecondary and business
- Present overview of Alignment Institute to groups critical to alignment effort

October 2008

Achieve convenes the first Alignment Institute and the Illinois Team:

- Overviews national data and rationale for alignment, related research, national college-ready benchmarks, international benchmarks
- Learns about comparison of state expectations and ADP Benchmarks
- Develops strategy and timeline for outreach to postsecondary and business and drafting of preliminary College and Career Ready Standards

March 2009

Achieve convenes the second Alignment Institute and the Illinois Team:

- Presents the results of their postsecondary and/or business outreach efforts
- Finalizes preliminary draft of College and Career Ready Standards for Achieve review
- Reviews additional analytics requested on analysis of K-8 standards in English and/or mathematics and refines plan with Achieve coach; plan may identify specific benchmarks for vertical alignment of K-8 standards with the College and Career Ready Standards that are being developed.

July 2009

Achieve convenes the third Alignment Institute and the Illinois Team:

- Presents their progress in alignment and next steps
- Receives Achieve's review of preliminary draft College and Career Ready Standards, identifies final revisions needed, and plans submission of final College and Career Ready Standards to Achieve for review
- Integrates next steps for vertically aligning K-8 standards with College and Career Ready Standards (when endorsed) to ensure a progression across K-12
- Plan process for adoption/endorsement of the K-8 and College and Career Ready Standards

August 2009 - January 2010

Achieve continues to work with the Illinois Alignment Team to:

- Convey to the state Achieve's final review of the College and Career Ready Standards and conclude the alignment process for identifying these expectations that are co-owned and mutually endorsed by K-12, postsecondary, and business.
- Plan next steps for integrating College and Career Ready Standards into related efforts such as high school graduation requirements, college-ready assessments such as the PSAE, admission and/or placement into postsecondary training and degree programs

Attachment A:

Individuals to Consider Including in Illinois' Alignment Team Activities

K-12 Representatives

- Associate superintendents, deputies, or upper management in the state board office or education agency who are responsible for the implementation of standards and assessments
- Staff member(s) in the state education agency who lead the development of high school mathematics and English standards and assessments
- High school teachers who have a depth of experience in transitioning students from high school to postsecondary (They may be recognized as leading "expert teachers" who are actively engaged in state level high school reform efforts or lead programs that focus on preparing middle and high school students for college, e.g. GEAR-UP, and alignment of curriculum and assessment across 6-12.)
- High school teachers who teach in Early College, International Baccalaureate or Advanced Placement Programs, or teach in the applied and technical programs that feed directly into programs at 2 and 4 year institutions
- High school principals and other education leaders who direct exemplary programs that have produced results in students' achievement and postsecondary entry and success

Postsecondary Representatives

- Postsecondary staff members who coordinate P-16 or high school to college articulation efforts or standards development for state postsecondary governing bodies, coordinating boards or systems of higher education
- Faculty who teach entry-level, credit-bearing coursework in English and mathematics courses on the 2- and 4-year campuses (Consider ways to engage faculty from all campuses and provide means to review work-in-progress via electronic bulletin boards, faculty e-mail networks, etc.)
- Faculty in mathematics and English who coordinate campus-based efforts to accurately assess and place students in entry-level coursework (In some cases these individuals might include senior faculty or department chairpersons who bring the institutional knowledge of past and current campus efforts to the alignment process.)
- Arts and sciences faculty, e.g. social sciences, science, and applied programs who have experience in articulating student learning expectations that are critical to success in entry-level coursework in that discipline
- Faculty with institutes, centers, or projects to improve the preparation of middle and/or high school students in mathematics and English Language Arts and have established partnerships with high schools and districts across the state (Consider Including in this group, representative faculty serving on state standards and assessment panels or those who direct the state content area associations and may work in partnership with high school reform efforts, e.g. Teachers of Mathematics, Teachers of Writing, etc.)

Representatives of the Business/Employer Community

- Front line managers from companies that employ large percentages of the state workforce in quality jobs that may require further education and training, e.g. state government and the military
- Employer or Labor representatives who devise and oversee technical training (e.g. apprentice) programs in the "skilled trades"
- Personnel directors or human resource personnel particularly those responsible for math and English screening of incoming employees for specialized jobs (e.g. utility and power companies)
- Postsecondary faculty in the applied fields and career technical educators from the programs at 2 and 4year institutions that connect directly with the state's workforce preparation effort. (These individuals contribute valuable perspectives on the rigor of math, reading, and writing skills required in entry-level coursework in the technical and applied fields that a number of students will enter after high school.)
- Representatives of key business groups in the state including the Chamber of Commerce and professional business associations

A REPORT ON

ENGLISH LANGUAGE ARTS, SCIENCE AND MATHEMATICS STANDARDS FOR ILLINOIS

ACHIEVE

MAY 2008

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EXECUTIVE SUMMARY

Achieve, Inc. is a bipartisan, non-profit organization created by the nation's governors and corporate leaders to help states raise their academic standards, improve their assessments and strengthen accountability to prepare all young people for postsecondary education, work and citizenship. A principal part of Achieve's mission is to provide state policymakers with an independent, expert review of the quality of their standards and tests. Achieve has been conducting such reviews of standards for over nine years.

Achieve was asked to review the Illinois Stage I (grades 8, 9, 10) and Stage J (grades 11, 12) Performance Descriptors (hereafter called "descriptors") and to compare them to Achieve's exemplars in English, science and mathematics.[1] The findings in this report represent consensus opinions of Achieve's teams of national experts, but final judgments and conclusions rest with Achieve. This report provides policymakers with answers to the following questions:

1. How do the Illinois Learning Performance Descriptors compare with the rigor of standards set by Achieve's exemplars in English language arts, science and mathematics?
2. How well do the Illinois Learning Performance Descriptors in the three content areas measure up against the criteria of coherence, progression, focus, specificity, clarity and measurability?

In addition to this summary report, Achieve has prepared a detailed technical report for the Illinois Department of Education. Brief biographies of experts and consultants who participated in Achieve's standards benchmarking for Illinois can be found in the Appendix.

ILLINOIS MATERIALS REVIEWED

The Illinois Learning Standards (ILS) adopted in 1997, were developed using the 1985 Illinois State Goals for Language Arts and Mathematics. The ILS not only defines what students should know and be able to do but also is designed to guide and enable students to meet those standards. Subsequently, Illinois teachers developed a set of Performance Descriptors, which evolved from the State Goals and Standards and were intended to be resources that help make the benchmarks and standards more specific. This report focuses on these Performance Descriptors since they provide the most specific information about the student expectations.

RESULTS FOR ILLINOIS

- **While the Illinois descriptors have real strengths, Achieve found significant gaps in the expectations when compared to the exemplar standards, especially in English language arts and science.**

[1] In this review, Achieve's exemplars in English and mathematics are its American Diploma Project (ADP) Benchmarks; in science the exemplars are the NAEP 2009 Science Assessment Framework and the Massachusetts Science and Technology/Engineering Curriculum Framework.

The Illinois standards and descriptors in English language arts are well aligned with the ADP strands of Language, Research and Writing; they helpfully emphasize using the language arts to acquire, assess and communicate information. They are much less well aligned, however, with the important strands of Communication, Logic, Informational Text, Media and Literature. There are key gaps in areas that our research shows are essential for student success in college and the world of work. ADP places a high value on teamwork as an essential communication skill, which is not evident in the Illinois materials. Additionally, many crucial elements from the ADP Logic strand are absent from the state standards, particularly in terms of evaluating and understanding logical argument. Important skills in the comprehension of informational texts and media are also not included in the state's standards. Lastly, ADP stresses knowledge of the foundational works of American literature and national documents, but such attention is not evident in the state's present framework.

The Illinois science standards and descriptors are not well aligned with the exemplar standards Achieve used in this review. They sacrifice focus and rigor for breadth of coverage. This is in part due to the large number and variety of topics and performances covered. It is also the result of the way in which the descriptors are structured, which makes it difficult to discern the priority concepts and skills in the life/environmental, physical and Earth/space sciences. A positive aspect of the Illinois descriptors is that they highlight the important role of inquiry, mathematical thinking, and technology and engineering in science–critical aspects of scientific literacy that are often overlooked in state standards.

Overall, the alignment between the Illinois mathematics standards and descriptors and the ADP Benchmarks is strong. The Illinois mathematics descriptors define rigorous expectations that would prepare students for the demands of college and work, striking an effective balance among the conceptual, procedural and application aspects of mathematics. They focus on establishing connections across the various domains of mathematics at the high school level and also do a good job of stressing problem solving and modeling. There are, however, some areas within the Illinois mathematics standards that could be strengthened. In some cases, there are key concepts that should be emphasized; in other cases, greater specificity in the descriptors would help clarify the expectations.

- **In all three content areas, the Illinois descriptors lack the clarity and specificity necessary to convey the level of performance expected of students.**

In some instances, the language of the descriptors lacks the specificity required to ensure consistent interpretation. For instance, the Illinois materials in English include such vague expectations as "Demonstrate understanding of materials, concepts and ideas," or "Communicate effectively the intended message," which does not provide enough specificity to support instruction or clearly describe a performance. Contributing to this lack of precision is the inclusion of multiple performance expectations within a single descriptor – in science, for instance, multiple expectations within a single descriptor are sometimes conjoined with "or," leaving the impression that meeting just one of these expectations would be sufficient.

In other instances the lack of a clear example hampers the interpretation of what the descriptor is trying to convey. The expectations of several of the Illinois mathematics descriptors suffer due to

the lack of specificity in the language and the scarcity of examples. For instance, with respect to proof, the descriptors would benefit from specification of key theorems or examples of theorems which students are expected to prove. Merely stating, as Illinois does, that students are to "develop a formal proof for a given geometric situation on the plane" does not present a clear picture for teachers across the state as to what level of proof students are expected to provide. Similarly, calling for students to "solve practical problems using non-linear scales" is not worded precisely enough or accompanied by examples that would help ensure consistent interpretation across Illinois.

- **To varying degrees, the progression of expectations from Stage I (Early High School) to Stage J (Late High School) in all three content areas is not clearly developed.**

In English language arts, a variety of problems contribute to the lack of a coherent progression from Stage I to Stage J. Some descriptors embed multiple tasks and topics within the same standard, making it difficult to trace the progression and development of any important skill across both grade spans. Other descriptors are so broadly stated that it is difficult to determine their relevance to any particular grade span, and inconsistent formatting – needed to signal relationships between standards – exacerbates the problem. Often different topics and skills (under the same general heading) are introduced at a higher level but omitted at the lower one, obscuring the rationale for grouping them together and eliminating the sense that earlier skills are being built upon and enriched.

As is the case with English language arts, the descriptors in science do not show a clearer line of development from Early to Late High School. Too often the Stage J descriptors connect only loosely to the content described in the preceding Stage I descriptors, due in part to the multiplicity of topics and performances included in the descriptors, their wide variability in grain size and their confusing syntax. Similar to the weaknesses identified above regarding the progression of Illinois' mathematics descriptors, the state's science descriptors would benefit from being reorganized into one or more model course sequences in life/environmental science, chemistry, physics and Earth/space science since that is typically the way high school instruction is delivered.

With regards to mathematics, while the progression from the Stage I to Stage J descriptors is generally logical and appropriate, the Illinois standards – as they are currently configured – do not provide a meaningful structure that models a solid progression of mathematical content and skills across the high school years. Additionally, reorganization of the mathematical descriptors into one or more model course sequences would help Illinois educators make a connection between the state's mathematics descriptors and its high school graduation requirements, which call for three years of mathematics including Algebra I and a course containing Geometry content.

RECOMMENDATIONS FOR IMPROVEMENT

As Illinois continues to move forward in its steady pursuit of rigorous standards, Achieve recommends that the state consider making the following improvements:

- **Rework the Illinois standards in English language arts, science and mathematics so they fully embody 21st century knowledge and skills and more closely align to Achieve's exemplars in English language arts, science and mathematics.**

This report focused on the 2002 Performance Descriptors, a set of expectations added to the 1997 Learning Standards that were themselves an outgrowth of the 1985 Illinois State Learning Goals. Each iteration of the standards' document intended to add further specificity to the prior materials, thereby providing support for the state's students. It may now be an opportune time to consider if such retrofitting is the most effective way to achieve the goal of clear, specific and rigorous student expectations in these content areas. Issues of clarity, rigor and progression may be addressed more effectively by determining the knowledge and skills that are required for success in the college classroom or in the workplace, and working back from those demands to construct sets of standards and performance expectations that help the state's students face the demands of the 21st century.

- **Revise the Illinois descriptors in English language arts, science and mathematics to achieve greater precision in coverage, clarity, and progression between grade spans.**

This report identifies the 2002 Performance Descriptors as helpfully articulating for teachers and students how to unpack the 1997 Learning Standards and put them into action. The general concerns raised above and those articulated in greater detail below indicate that more work needs to be done to make them even more useful and applicable in light of Achieve's English, science and mathematics exemplars that identify 21st century knowledge and skills. Remedying the identified gaps in coverage combined with more precise wording and examples would greatly benefit their users, as would clarifying expectations, measurability and the progression of content and skills between grade levels.

* * *

Illinois' commitment to continuous improvement is admirable and important; it reflects an appreciation for the ever increasing demands and opportunities students face when they graduate from high school, as well as the need for the state to raise expectations over time to help ensure all students are prepared for these opportunities.

Illinois is not alone in its quest to ensure that its standards are meaningfully connected to the world students will enter after high school. Thirty-three states that are part of the American Diploma Project Network are also committed to aligning their high school standards with the demands of college and careers. Illinois is well positioned to benefit from the experiences of these states as it charts its own path on standards.

ACHIEVE'S STANDARDS REVIEW METHODOLOGY

Achieve has been conducting reviews of standards for nine years through benchmarking a state's Academic Standards to "exemplary standards" recognized for their quality and for producing high student achievement. Achieve reviewers consider aspects of quality standards captured in the following questions:

RIGOR – What is the intellectual demand of the standards?

COHERENCE – Do the standards convey a unified vision of the discipline and establish connections among the major areas of study?

PROGRESSIOn- Do the standards show a meaningful progression of content across the grades?

FOCUS – Have choices been made about what is most important for students to learn, and is the amount of content manageable?

SPECIFICITY – Are the standards specific enough to convey the level of performance expected of students?

CLARITY– Are the standards clearly written and presented in an error free, legible, easy-to-use format that is accessible to the general public?

MEASURABILITY – Is each standard measurable, observable, or verifiable in some way?

BENCHMARK STANDARDS

For the purposes of this standards review, the ADP Benchmarks for College and Workplace Readiness represent the appropriate threshold for the criteria listed above in the content areas of English language arts and mathematics while the *NAEP 2009 Assessment Framework* and the *Massachusetts 2006 Science and Technology/Engineering Curriculum Framework* represent the appropriate threshold in science.

ABOUT THE AMERICAN DIPLOMA PROJECT (ADP) BENCHMARKS FOR COLLEGE AND CAREER READINESS FOR ENGLISH AND MATHEMATICS

The ADP Benchmarks, released in the 2004 report *Ready or Not? Creating a High School Diploma That Counts*, are the result of two years of intensive research conducted in colleges and universities as well as workplaces across the country. To help pinpoint the academic knowledge and skills required for future employment, ADP commissioned leading economists to examine labor market projections for the most promising occupations – those that pay enough to support a family and provide real potential for career advancement. ADP then surveyed officials from 22 industries, ranging from manufacturing to financial services, about the most useful skills for their employees to bring to the job. ADP also worked closely with two- and four-year postsecondary

faculty from five partner states to determine the prerequisite English and mathematics knowledge and skills required to succeed in entry-level, credit-bearing higher education courses. These conversations revealed an unprecedented convergence of the knowledge and skills these employers and postsecondary faculty say are needed for new employees and freshmen entering credit-bearing coursework. In English, the benchmarks reflect four years of grade-level high school courses that emphasize logic, writing and research, while in mathematics, the benchmarks reflect a rigorous four-year course sequence that includes content typically taught in Algebra I, Geometry and Algebra II, as well as some data analysis and statistics. The ADP Benchmarks and sample tasks from employers and postsecondary faculty may be found at www.achieve.org.

ABOUT ACHIEVE'S BENCHMARKS FOR SCIENCE

In selecting benchmarks for science, Achieve reviewed state reports from the Thomas B. Fordham Foundation and the American Federation of Teachers (AFT) and solicited nominations from science educators. Content experts then evaluated the core areas of life, physical and Earth/space science, as well as strands dealing with inquiry and the nature of science. Achieve selected standards from Delaware (2003), Indiana K – 8 (2000), *Massachusetts Science and Technology/ Engineering Curriculum Framework* (2006) and NAEP 2009 Science Assessment Framework as benchmarks. For this review, Achieve chose the Massachusetts and NAEP documents to use in analyzing *Illinois Learning Standards* Goals 11, 12 and 13 and related performance descriptors for early and late high school in science. Achieve's science benchmark standards describe what students should learn by the time they graduate from high school in the areas of life science, chemistry, physics, Earth/space science, and scientific inquiry and technological design.

MAJOR FINDINGS & RECOMMENDATIONS: ENGLISH LANGUAGE ARTS

COMPARISON OF ILLINOIS PERFORMANCE DESCRIPTORS WITH THE BENCHMARK STANDARDS

STRENGTHS OF THE CONTENT STANDARDS

- **In the areas of Language, Research and Writing, the Illinois descriptors in English language arts address knowledge and skills students need to succeed in college and range of careers and exhibit strong alignment with the ADP English Benchmarks.**

The Language strand of the ADP Benchmarks emphasizes grammar, conventions and vocabulary skills that allow students to understand and communicate clearly, easily and effectively. The degree of alignment between the Illinois *Language Arts Descriptors* and the ADP Language strand is good and is particularly strong in the area of writing. Excellent alignment exists, for example, for standards about using language appropriate to audience and purpose, revising in response to reader's comments, citing sources, using technology, and writing well-developed and coherent academic essays. The Illinois descriptors also clearly identify some work-related texts (applications, letters, resume) and are generally aligned to the specific writing criteria identified in ADP. As well, the Illinois materials provide some guidance for effective work-related documents, such as J.3C.4 – "Apply appropriate format and structure that effectively address a variety of real-life situations" – and I.5A.4 – "Organize information for different formats (e.g., narrative report, data analysis)." The Illinois descriptors devote a separate strand to research, and its alignment with the benchmarks in ADP's Research strand is also strong.

RECOMMENDATIONS FOR IMPROVEMENT

- **The alignment between the Illinois descriptors and the ADP English Benchmarks needs to be strengthened for rigor and overall coherence in the areas of Communication, Logic, Informational Text, Media and Literature.**

The state's introduction to its English language arts Learning Standards states that:

> English language arts includes reading, writing, speaking, listening and the study of literature. In addition, students must be able to study, retain and use information from many sources. Through the study of the English language arts, students should be able to read fluently, understanding a broad range of written materials. (http://www.isbe.net/ils/ela/standards.htm)

This attention to "a broad range of written materials," however, is not clearly reflected in the present descriptors. For example, the Communication strand of the ADP Benchmarks emphasizes the oral communication and teamwork skills needed for success in postsecondary education and the world of work. While both ADP and the Illinois descriptors expect students to

make oral presentations, a skill used more and more in both college classrooms and careers of the 21st century, ADP places a high value on teamwork that is not evident in the Illinois materials. Although it has been the tradition in American education that the individual is the sole producer of information or problem solver, the reality of today's workplace and, increasingly, college classrooms, is that working in a group is the preferred mode of producing materials and generating solutions. While the state requires that students engage in literary discussions and discuss problems, the range of purposes for work groups as described in ADP goes well beyond these two situations.

Likewise, although this same Illinois introduction emphasizes problem solving, many crucial elements from the ADP Logic strand are absent from the state materials. Although the state expects its students to "analyze and evaluate information" (I.5B.1), this broadly stated expectation does not support the in-depth understanding and evaluation of logic expected by ADP. The specificity of the benchmarks suggests that an ignorance of the wide range and scope of rhetorical devices and common fallacies signals the potential for misrepresentation of information. These criteria are critical elements to the analysis and development of arguments, moving students from the mere listing of supporting ideas and facts to understanding and using logic and understanding to analyze and support beliefs and arguments.

Additionally, important skills in the comprehension of informational texts are not included in the state's document. For instance, the Informational Text strand of ADP emphasizes the skills required to read, analyze and evaluate informational texts, including their design and accompanying graphics. The ADP benchmarks are explicit in their attention not only to informational materials but also to technical documents like computer, appliance or automotive manuals. This attention to technical materials is evident in the ADP benchmark to "Follow instructions in informational or technical texts to perform specific tasks, answer questions or solve problems" – an expectation, among others, not included in the Illinois materials. One recommendation to address some of these issues would be to separate general reading skills from those particular to approaching informational or literary texts; doing so would communicate that although all text types share many of the same elements, both informational and literary texts demand skills specific to that genre. This would involve adding a strand entitled "Informational Text" to the present five strands, which would highlight among other content the analysis of informational materials and media for their use or misuse of rhetorical devices and logic – particularly important in a world that inundates us with information on a daily basis.

The general lack of emphasis in the Illinois descriptors on media is striking given the importance of media in today's information economy and postsecondary expectations for competency in this area. None of the individual Illinois descriptors is well aligned with the ADP Media benchmarks. Among other expectations, ADP places a high value on the ability to evaluate aural, visual and written images and their ability to inform, persuade and entertain. The Illinois materials refer only to print media (the work of authors and illustrators) and not to the broader range of aural and visual media used in multi-media productions in a variety of modes (e.g. television, radio, film and the Internet.) As 21st century consumers, today's graduates need to be able to make informed judgments about media and products, and the Illinois materials should reflect an up-to-date understanding of the breadth of media materials students will encounter.

Lastly, the Literature strand of the ADP Benchmarks describes the skills and knowledge expected of students in relation to knowing, comprehending and analyzing important works of literature, poetry and drama. Although there are close links to three ADP benchmarks in the Illinois descriptors for literature, the overall alignment between the Illinois expectations for literature and the ADP Literature benchmarks is weak. ADP places a high value on knowledge of the foundational works of American literature and national documents. It may well be the case that such an emphasis is found in Illinois classrooms, but such attention is not evident in the state's present framework. It is also the case that being able to deal with complex texts is one of the most important abilities for success in college, and the state's lack of guidance regarding suggested reading for its students represents a missing opportunity in supporting student success.[2] Specificity in these materials – either by offering sample reading lists, like Indiana, or lists of authors, like Massachusetts, or even by describing the characteristics of text complexity that should affect text choice – will serve to support and guide explicit and implicit instruction articulated in Illinois' standards, as well as provide criteria for effective and successful performances.

- **The progression of increased expectation across Stages I and J needs to be more clearly conveyed.**

There are three overarching issues that Achieve's experts identified: lack of clarity related to progression, missing progression and format issues. With regard to the lack of clarity, some of the Illinois descriptors embed multiple tasks and topics within them, making it difficult to trace the development of any important skill across both grade stages. Others are so broadly stated that it is difficult to determine their relevance to any particular grade span. Because several of the standards are identical across the two grade spans, they fail to indicate a clearly stated progression.

In other instances, the descriptors introduce topics and skills (under the same general heading) at a lower level but not at a subsequent or higher level. Such shifts in focus and emphasis are not clear and do more to obscure progression than clarify. For example, the logic for introducing I.1A.3 – "Apply knowledge of roots and affixes to comprehend the meaning of unfamiliar or difficult words, terms, or phrases" – at the grade 8 – 10 span but not at the grade 11 – 12 span is unclear. The skill is an important one that students practice across the grades with texts that contain increasingly complex and subtle uses of words and with increasingly specialized vocabulary. It is also not clear why there is a standard for informational writing in the grade 8 – 10 span but not the grade 11 – 12 span. Students' skills in producing informational text are increasingly challenged as they encounter more abstract and complex topics, and producing effective informational texts is not a skill that is entirely mastered by grade 10. Progression could be communicated more clearly by revising those expectations that are so broad that they cannot inform increasing rigor through the grade levels. As well, attention to gaps in the expectations from one grade level to another would reveal whether a skill is presented in a developmentally accurate manner.

Lastly, the format of the descriptors also obscures the progression from one stage to another. Related numbered statements are not identified consistently with letters or numbers to signal that

[2] See ACT's *Reading between the lines: What the ACT reveals for college readiness*, January 2006.

certain ones correspond with others at the different grade spans. For example, there appears to be a crosscutting set of bullets that deal in one way or another with the use of prior knowledge in reading:

> **I.1B.2** Relate reading with information from other sources (e.g., prior knowledge, personal experience, other reading) using a variety of strategies.
>
> **J.1B.1** Relate reading to self, world, and other texts and experiences and make connections to related information.

The shift in number sequence from 1B.2 in Stage I to 1B.1 in Stage J serves to make it more difficult for readers to compare the standards across the spans to get a sense of progression because the same numbers may refer to entirely different skills. Assuring a parallel set of expectations simply in numbering systems would aid in making the progression of skills more obvious to the users of the document. Moreover, progression could be communicated more clearly by revising those expectations that are so broad that they cannot inform increasing rigor through the grade levels as well as attend to gaps in the expectations from one grade level to another.

- **The descriptors should be reorganized to contribute to a clear communication of the document's focus.**

The overall organization of the Illinois descriptors suggests that Illinois' priorities differ in significant ways from those of ADP. The ADP Benchmarks prioritize skills associated with language, logic, informational text and media by grouping these skills into separate strands. Some of the skills associated with these ADP priorities are embedded in the Reading, Writing, and Listening and Speaking strands in the Illinois descriptors, but several are missing altogether, as noted in the prior section on alignment and rigor. With its emphasis on logic and research and its separate focuses on informational and literary texts, ADP has redefined and added to the traditional view of English language arts. Although on the whole the Illinois descriptors are consistent with ADP and share this broadened view of English language arts, additional revisions and refinement are necessary to adequately complete the picture.

For example, some descriptors could be redistributed or added to other strands in order to focus attention on skills specific to a strand. The present Literature strand, for example, incorporates several descriptors for reading that could – and should – apply as well to nonliterary texts:

1. Respond to text by evaluating key ideas (I.2B.2)
2. Support an evaluation of the text using content from the media (I.2B.3).
3. Make connections between a text and its cultural environment (I.2B.4).
4. Evaluate how attitudes toward a situation or problem (e.g., attitudes concerning environment, immigrants, poverty, parent-child relationships) change in different periods of history or in different cultures (I.2B.5).

- **Descriptors that are too imprecise to communicate the state's expectations in terms of desired performances should be revised for clarity and precision.**

Although the state's materials affirm that the "primary purpose of the Performance Descriptors is to provide educators with clear descriptions of the performance expectations for the Illinois Learning Standards," expectations such as "Analyze a variety of texts for purpose, structure, content, detail, and effect," "Distinguish between a summary and a critique," or "Communicate effectively the intended message" are too all-encompassing to provide effective guidance to teachers. Contributing to a lack of precision is the inclusion of multiple performances within a single descriptor – such as "Develop, collect, and analyze various kinds of information related to a topic." Each stage of this multi-step task – developing, collecting, and analyzing – involves multiple skills, and combining them diffuses any understanding of the enormity of the task. Broadly stated descriptors such as these are unlikely to convey the necessary information that would result in the desired student performance nor provide "classroom resources to help teachers plan their own curriculum," as stated in the state's introduction to its English language arts Learning Standards.

- **While some of the Illinois descriptors are generally verifiable; a number of other descriptors should be revised to make them measurable.**

Many of the Illinois descriptors use performance verbs that convey what students are expected to do or show what they know, such as *apply*, *determine*, *define*, and *evaluate*. Yet some descriptors reflect ongoing curriculum activities or processes – rather than the results of those processes – such as "Extend ideas and enrich vocabulary through independent exploration of words." Others – such as "Select and read books for recreation" – reflect habits of mind as opposed to knowledge or skills. Others are difficult to measure because they refer to internal processes – such as "Modify, control, block out both internal and external distraction." The first criterion for a clear descriptor should be an effortless response to the question "How do I know it when I see it?", and those descriptors that fail to elicit a clear response to that question should be revised for measurability.

MAJOR FINDINGS & RECOMMENDATIONS: SCIENCE

COMPARISON OF ILLINOIS PERFORMANCE DESCRIPTORS WITH THE BENCHMARK STANDARDS

STRENGTHS OF THE CONTENT STANDARDS

- **The Illinois goals and descriptors in science align to important aspects of Achieve's science exemplars and target the knowledge and skills students need to be scientifically literate.**

The context for the descriptors in science is established by Illinois' three goals in science:

- Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems;
- Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences and;
- Understand the relationships among science, technology and society in historical and contemporary contexts.

Illinois' overarching goals provide a solid framework for scientific literacy and the topics and performances encompassed by the Illinois science standards and descriptors reflect significant agreement with the knowledge and skills laid down by the Achieve science exemplars. The Illinois science descriptors, for example, call attention to scientific inquiry, technological design and the mathematical underpinnings of science. Each of these represents highly developed knowledge and skills that are enormous assets for students who will live and work in a global society driven by advances in science, technology and engineering.

RECOMMENDATIONS FOR IMPROVEMENT

- **The amount of content in the Illinois science descriptors should be streamlined to present a vision that concentrates student learning on central concepts; at present content is excessive in some areas and weakly developed in others, contributing to an overall lack of coherence.**

Illinois includes a wide array of concepts and skills in its descriptors, so much so that essential core knowledge that should be the target of instruction does not always emerge. And despite the broad coverage, some key ideas fundamental to understanding biology, chemistry and physics, as well as some "big ideas" that characterize all of science, are omitted or inadequately treated. When Illinois undertakes its next standards revision, it will want to identify a critical core of essential content for inclusion in the descriptors, emphasizing the core concepts fundamental to each field and the crosscutting "big ideas" that unite them. This process will involve trade-offs in specifying core content in life/environmental, physical and Earth/space science, perhaps best

accomplished by Illinois scientists and engineers working in conjunction with high school teachers to identify key concepts and ideas.

At the same time, Illinois should tighten the focus of its performance descriptors to help ensure that the most important knowledge and skills receive the emphasis they deserve and that the amount of content is kept manageable. As it stands now, descriptors often contain multiple diverse ideas – so many that the core knowledge and skills that students should learn and be able to apply do not emerge from the medley of topics. Moreover, some key concepts – too important to be bypassed – are missing from life/environmental science, chemistry, physics and Earth/space science. The descriptors should help students make sense of each major field by emphasizing the content based on the concepts, laws and unifying theories upon which each field is based – such as evolution in life science, the atomic theory in physics, bonding in chemistry and plate tectonics in geology. The explanatory and predictive power of these overarching theories makes them invaluable in making sense of natural phenomena, but they also serve as "mind maps," helping students organize, learn and retain new information by connecting it to what they already know. The state also is not taking full advantage of the opportunity to infuse mathematics skills by specifying quantitative relationships that students should be able to apply.

- **The level of rigor of Illinois' science descriptors is often masked by the way in which the descriptors are structured and phrased. Illinois should consider devising a more effective template for the science descriptors.**

Each descriptor consists of a single, lengthy statement that lists a wide array of topics and performances, making it difficult to understand what level of accomplishment the state expects of students. For example, in the area of life/environmental science Stage J.12B.1 states**:**

> Apply scientific inquiries or technological design to research the sustainability of water resources, sketching and quantifying the hydrologic cycle locally and globally, describing the role of oceans on climatic systems, describing the impact of invasive organisms, alterations of chemical and microbial concentrations (pollutants, salinity), global and site average temperatures, simulating water supply recharge/deficit/surplus and groundwater infiltration, modeling effects of point source and non-point source pollution, or explaining water and sewage treatment.

While the topics and performances are meaty, the length and confusing syntax make it difficult to extract the kind and level of student performances that would meet state standards.

Additionally, as illustrated above, all the performance descriptors (except those grouped under Goal 11 – scientific inquiry and technological design) begin with the identical phrase, "Apply scientific inquiries or technological designs to …." While the phrasing is undoubtedly meant to underscore the centrality of inquiry and design in science, repetition of the phrase ultimately clouds what students are actually supposed to know and be able to do with the concepts of the life/environmental, physical and Earth/space sciences.

Lastly, most of the descriptors use *or* – rather than *and* – to link the sequence of performances they include. The incorporation of *or*, as illustrated above, suggests that any one of the listed

performances would be sufficient to meet the standard.

Moving forward, the "template" used by Illinois in developing its performance descriptors in science should be revised to unambiguously communicate the knowledge and skills the state expects its students to acquire. NAEP statements, for example, "tell a story" about a concept, organizing content expectations around a major header, while Massachusetts identifies a central or broad concept and then specifies expected student understandings and performances in straightforward language.

Consider the following comparison:

NAEP GRADE 12	MASSACHUSETTS	ILLINOIS STAGE I
MATTER: Changes in Matter **P12.6:** An atom's electron configuration, particularly of the outermost electrons, determines how the atom can interact with other atoms. The interactions between atoms that hold them together in molecules or between oppositely charged ions are called chemical bonds. **P12.7:** A large number of important reactions involve the transfer of either electrons (oxidation/reduction reactions) or hydrogen ions (acid/base reactions) between reacting ions, molecules, or atoms. In other chemical reactions, atoms interact with one another by sharing electrons to create a bond. An important example is carbon atoms, which can bond to one another in chains, rings, and branching networks to form, along with other kinds of atoms – hydrogen, oxygen, nitrogen, and sulfur – a variety of structures, including synthetic polymers, oils, and the large molecules essential to life.	**4. Chemical Bonding** *Central Concept*: Atoms bond with each other by transferring or sharing valence electrons to form compounds. 4.1 Explain how atoms combine to form compounds through both ionic and covalent bonding. Predict chemical formulas based on the number of valence electrons. 4.2 Draw Lewis dot structures for simple molecules and ionic compounds. 4.3 Use electronegativity to explain the difference between polar and nonpolar covalent bonds. 4.4 Use valence-shell electron-pair repulsion theory (VSEPR) to predict the molecular geometry (linear, trigonal planar, and tetrahedral) of simple molecules. 4.5 Identify how hydrogen bonding in water affects a variety of physical, chemical, and biological phenomena (e.g., surface tension, capillary action, density, boiling point). 4.6 Name and write the chemical formulas for simple ionic and molecular compounds, including those that contain the polyatomic ions: ammonium, carbonate, hydroxide, nitrate, phosphate, and sulfate.	**12C.3** Apply scientific inquiries or technological designs to investigate the atomic and nuclear structure of matter, examining historical atomic theories and quantum theory, modeling nuclear and electron configurations and their reactions, or predicting bonding and molecular structure.

In revising the format, Illinois should shorten its statements; avoid repeating the same introductory phrase in descriptors that apply to life/environmental, physical and Earth/space science; limit the number of performances in each descriptor; and avoid the use of *or* when linking performances unless they are essentially equivalent in terms of content and cognitive demand.

- **Illinois descriptors should be re-focused on stating the most important concepts and skills students need to know and apply, rather than reading as a lengthy list of topics.**

Illinois' overarching statements of its three science goals and related sub-goals generally do a good job in characterizing the nature of science and technology and each field of science. Rather than organizing the descriptors around major ideas, however, each descriptor tends to include an extensive span of topics. As a result, the descriptors sometimes include concepts of less significance while excluding those of greater consequence in building foundational knowledge. For example, the descriptors in life/environmental science contain so many diverse ideas that the core knowledge and skills that students should learn by graduation from high school do not emerge from the mix of major and minor topics. It is also the case that some descriptors – for example those related to physics – describe content in such cognitively demanding terms that it is not likely to be within the grasp of even the most advanced students. While all areas have some gaps in essential content, chemistry is particularly weak in that key concepts fundamental to understanding the field, such as the Periodic Table, acids, bases and salts, and oxidation-reduction reactions, are bypassed. The descriptors also do not highlight inter-disciplinary connections, even when the nature of the subject matter lends itself to forging linkages, such as life/environmental science.

- **To convey plainly what is expected of students, Illinois' descriptors in science should be revised for clarity and specificity.**

Although Illinois' descriptors generally avoid jargon and use technical language as appropriate for high school science standards, the phrasing and word choice of the descriptors often makes them difficult to interpret, even for science educators. Consider the following physics descriptor:

> **I.12D.4** Apply scientific inquiries or technological designs to explain harmonic motion, describing the scope of vibrational motion, calculating harmonic periods variations, constructing variations to linear and angular simple harmonic motion and elastic constants, or exploring historic studies which established applicable constants, laws and theories. For example, what is meant by "calculating harmonic periods variations, constructing variations to linear and angular simple harmonic motion and elastic constants …?"

The following comparison of an Illinois descriptor with a related benchmark standard underscores how important specificity is to defining rigor.

Massachusetts High School Standards for Biology	Illinois Descriptors Life Science Content
2. Cell Biology *Broad Concept:* Cells have specific structures and functions that make them distinctive. Processes in a cell can be classified broadly as growth, maintenance, and reproduction. 2.4 Identify the reactants, products, and basic purposes of photosynthesis and cellular respiration. Explain	**I.12 A.2** Apply scientific inquiries or technological designs to analyze cellular structures and functions explaining functional processes chemically and structurally (e.g., osmotic, active and facilitated transport, enzyme action and protein/lipid/carbohydrate metabolism).

the interrelated nature of photosynthesis and cellular respiration in the cells of photosynthetic organisms. 2.5 Explain the important role that ATP serves in metabolism.	

Science exemplars – such as those in the Massachusetts framework – articulate precise requirements for student learning, making the level of expected rigor relatively easy to discern. The fact that Massachusetts sets its standards in a larger context (broad concept) adds to their transparency.

In other instances, the sweep of some of the Illinois descriptors is too global to translate effectively to classroom practice. For example, Goal 13 is devoted to the effect of science and technology on society, an important concern, but the descriptors are often so unwieldy that teachers are likely to be at a loss when it comes to integrating them with the core content of the sciences. Consider the breadth and depth of the following example:

> **J.13B.5** Analyze how scientific and technological progress have affected job markets and everyday life, investigating projected trends over 2-3 decades, or assessing costs for technological progress on personal, governmental, economic and ecosystem impact in the sciences.

When revising, Illinois may want to consider a two-way strategy to make the descriptors more attainable: Narrow the focus of the descriptors and root them in the most closely related content area, and devote at least one descriptor in each content area to a "turning point" in the field, such as the acceptance of plate tectonics in Earth/space science. Adopting this kind of approach will make societal concerns more accessible and teachable. An added benefit of studying representative case studies is that it reveals the changing, ever-evolving nature of science knowledge.

- **Overall, the science descriptors need to be revised to show a clear line of development from expectations for Early High School (Stage I) to Late High School (Stage J).**

The progression of conceptual understanding in the natural sciences benefits from a carefully staged evolution in terms of complexity of content and the cognitive demand of performances. Although there is a degree of articulation between the stages for Earth/space science and chemistry, progression between Stage I and Stage J is weak in the areas of scientific inquiry; life/environmental science; physics; and science, technology and society.

Moreover, some descriptors appear to be high school appropriate while others extend beyond what is reasonable to expect of most high school students. In physics, for example, rather than addressing core concepts omitted from Stage I descriptors, Stage J takes on topics in modern physics that not only exceed NAEP and Massachusetts standards but also lie beyond what is normally covered in the College Board Advanced Placement B or C curricula.

If Illinois decides to retain its overall format of utilizing stages to delineate expectations in

science, rather than course-by-course descriptions as many states do, then it might want to conceptually consider Stage I as a first semester course and Stage J as a second semester course to clarify thinking about how to distribute content within each field and how best to develop crosscutting proficiencies like conducting research.

- **Illinois' science descriptors are good at capturing the varied performances that can characterize proficiency in science, but in the end the quality of the performances is overshadowed by the quantity of performances included in many descriptors.**

Illinois' performance descriptors in science call for a variety of measurable performances, such as *analyzing*, *modeling*, *documenting*, *predicting* and *synthesizing* while avoiding performances like *appreciate* and *value* that do not lend themselves to direct observation or assessment. Measurability is a crucial aspect of successful standards and descriptors, and Illinois is on the right track in framing their descriptors in verifiable terms. In any revision of the standards, however, Illinois will want to reduce the number of performances typically embedded in a single descriptor so that teachers and assessment developers will know precisely what performances demonstrate that a student has met the standards.

MAJOR FINDINGS & RECOMMENDATIONS: MATHEMATICS

COMPARISON OF ILLINOIS PERFORMANCE DESCRIPTORS WITH THE BENCHMARK STANDARDS

STRENGTHS OF THE CONTENT STANDARDS

- **The Illinois descriptors demonstrate an appropriate balance in conceptual understanding, procedural knowledge and problem solving skills with an emphasis on application and modeling.**

A particular strength of mathematics descriptors is that they include expectations that build a conceptual foundation and attempt to strike a balance among the conceptual, procedural and application aspects of mathematics. Examples of descriptors which stress conceptual understanding are the many expectations which call for students to explain the relationship between two concepts, compare and contrast properties, represent concepts in multiple formats, explain the connection between concepts, and explain differences and similarities. Many descriptors stress problem solving or modeling, as in, for example "Model and solve real problems using mathematical functions and relations" (J.8C.5).

- **The Illinois descriptors are effective in establishing clear connections among the various domains of mathematics.**

Even though the descriptors are organized into five distinct content goals, Illinois does a good job of establishing strong connections both within and across the domains of mathematics. The degree of emphasis placed on application, mathematical modeling, families of functions and transformations provide strong unifying themes across the standards and help ensure their coherence.

RECOMMENDATIONS FOR IMPROVEMENT

- **While the Illinois descriptors define rigorous expectations that generally align well to the ADP Mathematics Benchmarks, there are some significant exceptions.**

While there is solid alignment between the Illinois descriptors and the ADP Benchmarks – with one or more Illinois descriptors aligning with most of the benchmarks – there are some ADP Benchmarks that are not explicitly addressed in the Illinois standards. A few concepts found in ADP – such as evaluating polynomial and rational expressions or solving problems that can be modeled using a system of equations – are not addressed at all in the Illinois descriptors. As well, ADP expects students to be able to "Compare data sets using graphs and summary statistics" (ADP L1.4), and to distinguish "relevant from irrelevant information, identifying missing information and either finding what is needed or making appropriate estimates" (ADP MR6), and expectations such as these are not included in the Illinois descriptors.

In other instances, there is alignment between the Illinois descriptors and the ADP Benchmarks, but important differences in the level of expectation seem to be communicated in the wording of the standard in question. For example, the ADP Benchmarks and the Illinois standards reference technology in quite different ways. ADP includes two benchmarks that directly address the use of calculators and computers as problem solving devices both in and out of mathematics classrooms. In contrast, Illinois highlights the role of technology and specific types to be used by students in an introduction that is separate from the descriptors and easily overlooked. High school teachers and curriculum directors would benefit from descriptors that explicitly include references to appropriate uses of technology. In addition, no specific mention is made of making estimations without a calculator to detect errors.

- **While the Illinois descriptors are generally presented in clear and measurable terms, in some cases the language should be revised to include examples and specifically convey the level of performance expected of students.**

In selected instances, the language of the Illinois descriptors lacks the specificity required to ensure consistent interpretation. There are instances where the descriptors could be made more specific – using either more specific language or examples – thereby ensuring that teachers are consistently interpreting them and holding students accountable at the same level. Geometric proof is a vivid example. One of the great values of high school Geometry is that it builds on a logical system that offers students a way to formulate and test hypotheses and to justify arguments in formal and informal ways. For most students, geometric proofs are as close as they will come to any experience in classic logic at the secondary level, and the importance of understanding the role of definitions, proofs and counterexamples in mathematical reasoning extends far beyond the mathematics classroom. Yet, while proof is expected in the Illinois descriptors, it is cited vaguely, failing to address clearly what types and levels of proof Illinois students are expected to be able to do; therefore, the door is open to varying interpretations across the state. The properties of and theorems about parallel and perpendicular lines and angles and their use in proving theorems, for instance, is never clearly stated. In other cases, several descriptors call for students to "create and critique arguments concerning geometric ideas and relationships such as properties of circles, triangles and quadrilaterals" without clearly equating "arguments" and "proofs." This difference in specificity is clear in the comparison of the following expectations.

ADP Mathematics Benchmark	ILS High School Mathematics Descriptors
K2.1. Identify and apply properties of and theorems about parallel lines and use them to prove theorems such as two lines parallel to a third are parallel to each other and to perform constructions such as a line parallel to a given line through a point not on the line.	**G.9A.5** Perform constructions of congruent angles or parallel lines using a compass and straightedge, paper folding, or a mira. **I.9C.2** Develop a formal proof for a given geometric situation on the plane.

There are numerous other places where questions arise about the intent of the descriptors, given the lack of specificity in the language and the scarcity of examples within the high school descriptors. For example, an Illinois descriptor requires the student to "Decide if a survey was 'successful' in gathering intended data and justify the decision" (I.10B.3); however, no criteria are provided that would define "successful." In a similar manner, Illinois descriptor I.8C.4 requires that students "Solve problems using translations and dilations on basic functions," with

no definition of what constitutes a "basic function" provided. The inclusion of examples and/or problem contexts would be helpful in clarifying the descriptors that focus on problem solving – defining precisely the kinds and levels of problems students are expected to be able to solve.

- **Consider the limitations of a three-year course progression when revising the mathematics standards as well as clearly delineating the extent and range of the course content required within the present progression.**

As they stand, the Illinois mathematics descriptors include some aspects of content that extend beyond the expectations in the ADP Benchmarks and what may be either necessary for all students or manageable in three years of secondary mathematics instruction.[3] Exceeding the content and performance demands of the ADP Benchmarks poses no problem as long as the teaching and learning of such content is manageable within the time allotted. Given the Illinois graduation requirement for three years of mathematics, including Algebra I and some course including Geometry content, however, it is particularly problematic that the Illinois descriptors in Algebra, Geometry, and Data Analysis and Probability do not distinguish which descriptors are designated for all students and how they get distributed across the high school years. If the standards remain in their current format, consideration might be given to using asterisks to identify those descriptors required only for those students intending to take calculus – a system comparable to the one used in the ADP Benchmarks.

Another option is to revise the Illinois descriptors so they are organized by course. That way, the descriptors spanning the five Goals could be packaged to afford students a coherent and meaningful high school mathematics program as well as make clear which content is required of all students. Reorganizing the descriptors by course – either in traditional or integrated fashion or both – would clarify what is expected of all students and ensure consistency across the state in defining what is intended for such courses as Algebra I and Geometry.

Many states are moving to requiring four years of mathematics for all students, and Achieve supports such a trend. Even though Illinois students are not presently expected to take four years of mathematics, consideration should also be given to defining optional fourth-year mathematics courses for students, which could range from Pre-calculus and AP Calculus to more innovative capstone experiences intended for all students, and keying descriptors to those courses as well.

[3] Because major areas of study at postsecondary institutions have different prerequisites, certain elements of the ADP Mathematics Benchmarks represent content that is *recommended* for all students, but is *required* for those students who plan to take calculus in college, a required course for mathematics and many mathematics intensive majors.

CONCLUDING REMARKS

Illinois' commitment to raising expectations to ensure that all students leave high school with the 21st century knowledge and skills needed to be successful in college and the workplace is admirable. The world young people enter today is very different than even a decade ago. The skills necessary to be successful, whether young people go directly to college or the workplace, are more complex, and the preparation required in high school is more rigorous. State leaders are right to benchmark and refine their academic standards to ensure they set students on a path to success.

Illinois is not alone in this quest: Thirty-three states that are part of the ADP Network are also committed to aligning their high school standards with the demands of college and careers. Illinois is well positioned to benefit from the experiences of these states as it charts its own path on standards.

APPENDIX: BIOGRAPHIES

The following Achieve staff and consultants led the analysis and report development for Illinois.

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Achieve has identified many outstanding national experts in the English language arts, science and mathematics. As consultants, these content experts are contracted by Achieve to independently review and evaluate state standards. These reviews are synthesized by Achieve staff in order to produce reports based on the most current and respected theories and practice. The following consultants participated in the review of the Illinois standards.

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Jerome Halpern, a 30 year veteran teacher and English Department Chair in the Pittsburgh Public Schools, is a consultant and a part time faculty member with Department of English at the University of Pittsburgh, where he is the Coordinator for School Partnerships with the Western Pennsylvania Writing Project. He received a master's degree in education from the University of Pittsburgh and a bachelor's degree in education from Duquesne University.

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CONTENT EXPERTS AND REVIEWERS IN SCIENCE

JOSEPH L. ACCONGIO
Joseph Accongio is a science education consultant, who previously served as secondary principal, biology teacher, and science coordinator in the Rochester City School District, Rochester, NY. He received recognition as "One of 150 Exemplary Science educators in the USA," sponsored by the National Science Teachers Association and the National Science Foundation, on three occasions. He received a B.S. in General Sciences from the University of Rochester and an Ed.D. from the State University of New York at Buffalo.

DANINE EZELL

Danine Ezell currently serves as science project specialist for the San Diego County Department of Education. She has extensive teaching experience in the San Diego City School District, where she also served as a staff developer and Mentor Teacher at San Diego City College and the University of San Diego. She has worked with AAAS Project 2061 since 1989 and also worked on the National Science Education Standards. She received a B.A. in Zoology from Pomona College and a Ph.D. in Zoology from the University of California, Berkeley.

PAUL D. FULLAGAR

Paul Fullagar is Professor Emeritus of Geological Sciences, University of North Carolina at Chapel Hill. In addition to sustaining an active research career, resulting in nearly 100 publications in peer-reviewed journals, he has taught undergraduate and graduate students, has designed numerous professional development programs for high school teachers and has served as an administrator for specialized programs in science education. He received his Ph.D. from the University of Illinois.

ROBERT GOODMAN

Robert Goodman is the science chair and a teacher of physics and environmental science at the Bergen County Technical High School, Teterboro, NJ. Prior to becoming a teacher, he served as Chief Executive Officer for a number of corporations. Recently recognized as the 2006 New Jersey Teacher of the Year, he has also received an NEA Foundation Award for Teaching Excellence. He received his B.S. in physics from MIT, his M.A.T. in physics from SUNY Stony Brook and his Ed.D. in science education from Rutgers University.

CARY SNEIDER

Cary Sneider is Associate Research Professor at Portland State University in Portland, Oregon and is also a consultant for the state of Washington, for the Oregon Museum of Science and Industry and the Museum of Science. His previous positions include Vice-President for Education at the Museum of Science in Boston and Director of Astronomy and Physics Education at the Lawrence Hall of Science, University of California. In 2003, he was named National Associate of the National Academy of Sciences. He earned a bachelor's in astronomy from Harvard College, and a master's and Ph.D. from the University of California at Berkeley.

MARÍA A. LÓPEZ-FREEMAN

María Alicia López-Freeman is the Executive Director of the California Science Project—a professional development network of postsecondary faculty and K-12 teachers, and is also the Associate Director for Professional Development of the UC Science and Mathematics Initiative. Her previous experience includes teaching chemistry and physics in large urban high schools, where she served as department chairperson. She earned a bachelor's degree in chemistry and physics and a master's degree in education from Immaculate Heart College in Los Angeles.

CONTENT EXPERTS AND REVIEWERS IN MATHEMATICS

DONALD KING

Donald R. King is an Associate Professor of Mathematics at Northeastern University and a former high school mathematics teacher in Boston, Massachusetts. Since 2002, he has been co-

director of *Bridge to Calculus*, a mathematics enrichment program to increase the number of African-American and Hispanic students taking and passing AP Calculus. He received his Ph.D. in mathematics from the Massachusetts Institute of Technology.

MARY LYNN RAITH

Mary Lynn Raith is recently retired from the position of Mathematics Specialist in the Division of Instructional Support of the Pittsburgh Public Schools. She has also been involved with a number of national projects, including the development of both the New Standards Reference Examination and the Portfolio project for the middle grades, the Assessment Communities of Teachers project (ACT), and the Alternative Assessment in Mathematics project (A^2IM). She received her B.S. in mathematics from Indiana University at Pittsburgh and her M.Ed. in mathematics education from the University of Pittsburgh.

STATE OF CONNECTICUT
EXECUTIVE CHAMBERS

M. JODI RELL
GOVERNOR

January 4, 2008

Dr. Michael Cohen
President
Achieve, Inc.
1775 Eye Street NW, Suite 410
Washington, DC 20006

Dear Dr. Cohen:

On behalf of the State of Connecticut, I write to petition for our state's inclusion in the American Diploma Project. As you have learned from Commissioners McQuillan and Lewis who respectively lead our PK-12 and higher education sectors, Connecticut has set its sights on improving educational results for our youth across the continuum of learning from birth through college and into the workplace. Specifically, we are engaged in serious work and investment to: expand high quality early childhood education, especially for those segments of our population most in need; ensure that children by age nine have reached success benchmarks, particularly in literacy and numeracy; increase the rigor of curricula and raise performance in our secondary schools; and assure that students not only are college- and work-ready, but also prepared and supported to stay the course to reach credential and job goals.

The policy goals of the American Diploma Project match particularly well to ours. Indeed, Connecticut was a recipient of a National Governors' Association Grant in 2005 to support the formation of a PK-16 Council. The Council's specific goals were to align high school standards, curricula and assessment with knowledge and skills required for success in postsecondary education and work; and to build a data continuum that links our education sectors for the purpose of confirming student success. Since then, the State Board of Education has undertaken re-design of the secondary school experience, engaging academic, organizational and business leaders in the development of a core curriculum model that will be aligned to high state standards and multiple end-of-course assessments in both test and performance modes. This will be the year when we present this proposal to many communities of interest and solicit input, with the intent of submitting legislative proposals to Connecticut's 2009 legislative session.

Both the PK-16 Council and the Ad Hoc Committee on Secondary School Improvement have developed recommendations that mirror the ADP platform requiring all students to take a college- and work-ready curriculum in order to earn a high school diploma. Further, as Governor, I have publicly advocated for holding schools accountable for graduating students who are college-ready and then similarly holding higher education responsible for the success of their students. In fact, for

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the last seven years, the public higher education community has been reporting annually to me and to our General Assembly on a set of performance measures that focus upon student retention, graduation rates and production of a workforce in critical shortage areas.

It is with the full concurrence and advocacy of Commissioners McQuillan and Lewis, who co-chair our PK-16 Council, and their partners Ms. Janice Gruendel, Ms. Mary Ann Hanley and Mr. John Rathgeber, representing respectively the leadership of the Office of Early Childhood Education, the Office of Workforce Competitiveness and the Connecticut Business and Industry Association, that Connecticut seeks to join the American Diploma Project. These colleagues, together with a representative from my office, will act as our state leadership team, with Commissioner McQuillan as the primary point of contact.

Both the timing of this enterprise and its emphases on quality and results are precisely right to assist us in reaching Connecticut's goals to eliminate our achievement gap and improve the pipeline of students prepared to contribute to society. We look forward to hearing that we may have the opportunity to benefit from Achieve's advice and the counsel of the multiple states committed similarly to this important work as we move our agenda forward.

Sincerely,

M. Jodi Rell
Governor

cc: M. Gandal
J. Gruendel
M. Hanley
L. Kaufman
R. Keating
V. Lewis
M. McQuillan
J. Rathgeber
J. Zdanys

STATE OF TENNESSEE

PHIL BREDESEN
GOVERNOR

January 31, 2007

Mr. Michael Cohen
President
Achieve, Inc.
1775 I Street Northwest, Suite 410
Washington, D.C. 20006

Dear Mr. Cohen:

Thank you for your invitation to become a member of the American Diploma Project Network. My number one priority is education reform. The overarching goal is to ensure that our children can graduate from Tennessee public schools ready for college and the workforce, as I have always viewed this as an economic development and quality of life issue at the very core.

I commit to building a state leadership team, which will ensure that Tennessee is continuing to improve the college and workforce readiness of our high school graduates by working within the four principles of the American Diploma Project Network:

1. Aligning high school standards with college and work expectations.

2. Requiring all students to take more challenging college and work-prep courses.

3. Administering tests that measure readiness for college and work to all high school students.

4. Holding high schools and postsecondary institutions accountable for student success.

I am proud of the fact that Tennessee has already made significant strides in these areas. This work has included efforts of our commissioner of education, members of the State Board of Education, higher education stakeholders, leaders in the corporate world represented by the Tennessee Business Roundtable and Tennessee Chambers of Commerce, and entrepreneurial leaders in the philanthropic education community.

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We look forward to working closely with Achieve and other states joining the American Diploma Project Network to develop detailed action plans and to track our progress. Tennessee is honored to become a member and eager to work together with a cohort of states on pursuing these fundamental policy goals.

Warmest regards,

Phil Bredesen

PB/dk

cc: Dr. Lana Seivers, Commissioner of Education
Dr. Gary Nixon, Executive Director, Tennessee State Board of Education
Dr. Charles Manning, Chancellor, Tennessee Board of Regents
Dr. Rich Rhoda, Executive Director, Tennessee Higher Education Commission
Dr. John Petersen, President, University of Tennessee
Ms. Ellen Thornton, Executive Director, Tennessee Business Roundtable
Ms. Deb Woolley, President, Tennessee Chamber of Commerce and Industry
Senator Jamie Woodson, Chair, Senate Education Committee
Representative Les Winningham, Chair, House Education Committee

Achieve, Inc.
American Diploma Project Network

THE AMERICAN DIPLOMA PROJECT

CLOSING THE EXPECTATIONS GAP

In nearly every state today, students can meet the requirements for high school graduation and still be unprepared for success in college or the workplace. Simply put, our standards have not kept pace with the world students are entering after high school.

States need to raise standards for all students and tie high school tests and requirements to the expectations of colleges and employers. Colleges and employers must then honor and reward student achievement on state tests through their admissions, placement and hiring policies. This will send a powerful signal to students that it pays to meet higher standards in high school.

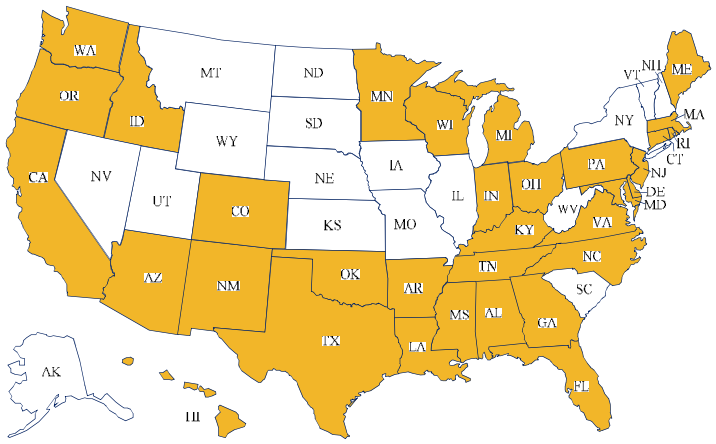
The American Diploma Project
The American Diploma Project (ADP) is an Achieve initiative created to ensure that all students graduate from high school prepared to face the challenges of work and college. The ADP Network includes 33 states dedicated to the same goal. ADP is designed to ensure that all states:

- Align high school standards and assessments with the knowledge and skills required for success after high school.
- Require all graduates to take rigorous courses – aligned to college- and career-ready standards – that prepare them for life after high school.
- Streamline the assessment system so that the tests students take in high school also can serve as placement tests for college and hiring for the workplace.
- Hold high schools accountable for graduating students who are ready for college or careers and hold postsecondary institutions accountable for students' success once enrolled.

The American Diploma Project Network

Thirty-three states – educating nearly 80 percent of America's high school students – have signed on to the American Diploma Project (ADP) Network. In these states, governors, state education officials, business executives and higher education officials work together to raise high school standards, strengthen assessments and curriculum, and align expectations with the demands of college and careers.

Although all Network states have committed to a common set of key policy priorities, there is no one-size-fits-all approach. Each state has developed its own action plan for carrying out the agenda. See the state profiles at Achieve.org for more details: http://www.achieve.org/node/317



Keeping Pace with Rising Knowledge and Skill Demands
In the new, knowledge-based economy, employers and college leaders are placing a higher premium on high-level math and communications skills than ever before. Yet, few states expect students to take high school courses in math through and beyond Algebra II or advanced courses in English and science, despite the research that finds students that complete this coursework are more likely to be successful in work and college. Only nineteen states have high school graduation requirements aligned with college and workplace expectations.

High School Graduates Are Not Prepared To Succeed
Far too many recent high school graduates enter college and the workplace unprepared for the demands of learning and earning. According to a survey commissioned by Achieve, 39 percent of recent graduates enrolled in college and 46 percent in the workforce say there were significant gaps in their preparation. Professors and employers estimate that four out of ten graduates are unprepared for college or employment.

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These gaps come with a steep price. States, postsecondary institutions, employers and young people spend an estimated $17 billion each year on remedial classes to re-teach material that should have been mastered in high school. This price tag might be acceptable if remediation was a proven fix, but one national study indicates that 76 percent of students who take remedial courses in reading and 63 percent of students who take one or two remedial courses in math fail to earn college degrees.

What Is Causing the Expectations Gap?
Only recently have state officials, together with college and business leaders, begun working to define what skills and content signify college and work readiness. This lack of collaboration has bred confusion in the past: parents, teachers, colleges and employers have no agreed-upon benchmark for what readiness entails, so students don't know what courses to take to ensure they are prepared. As a result, the case is not effectively being made that hard work in high school leads to future success in the marketplace, college, and beyond.

Unless these stakeholders come together, high school courses will continue to vary widely in their academic content and rigor. Although some students are exposed to content-rich and stimulating classes that build college- and work-ready skills in high school, many others only have access to courses that offer remedial and non-academic content. These watered-down courses are unlikely to engage students, let alone prepare them for work and college, and can lead to higher drop out rates.

Next Steps for the States
The good news is that progress is being made throughout the states. While only a handful of states have put into place the policies championed by ADP, many others are in the process of implementing them. Over half of the states already have aligned their academic standards and developed comprehensive data systems – or plan to do so in the coming years. There is certainly more work to be done, but the ADP agenda is gaining momentum.

About Achieve

Created by the nation's governors and business leaders, Achieve, Inc, is a bipartisan, non-profit organization that helps states raise academic standards, improve assessments and strengthen accountability to prepare all young people for postsecondary education, work and citizenship. Achieve was founded at the 1996 National Education Summit and has sponsored subsequent Summits in 1999, 2001 and 2005. At the 2005 Summit, Achieve launched the American Diploma Project Network.

Achieve provides policy and advocacy leadership, technical assistance and other support to the ADP Network states and is leading a number of initiatives aimed at meeting specific challenges states face while implementing the ADP policy agenda, including:

- *Alignment Institutes*: K-12, postsecondary and business leaders from each state come together to define the core English and math knowledge and skills graduates need to be ready for college and work and then revise their high school standards as necessary.
- *Algebra II Consortium*: Fourteen states have partnered to develop a new end-of-course assessment in Algebra II. Achieve is supporting the development of the test, providing an annual report comparing the performance of participating states, and helping the states share and develop tools and strategies for improving teaching and learning in high school math.
- *Research and Data*: Achieve is a resource of information, analysis and advice for state leaders through policy briefs, annual progress reports, public opinion polling, sample communications materials, and best practices.
- *State Outreach and Advocacy:* Achieve convenes states to engage in meaningful and strategic dialogue about policy and political strategies and to provide the opportunity for peer networking.

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