

**Commission for a College Ready Texas**  
**Meeting of Business Leaders and Faculty to Discuss College Readiness Standards**  
**September 7, 2007**

On September 7, 2007, Commission Chair Sandy Kress convened a meeting of business leaders and higher education faculty to discuss college ready standards. Chair Kress began the meeting by describing the mandate of House Bill 1 and the creation of the Commission for a College Ready Texas. He explained that Governor Perry and the Gates Foundation wanted a process that would support the work of the vertical teams by reaching out to business, faculty, and Texans across the state to gain their perspectives. To assist with the process, researchers have been examining and bringing together the best national research to help inform the vertical teams, the Texas Higher Education Coordinating Board, the State Board of Education, and the Texas Education Agency to develop a definition of college readiness that will inform state standards and lead to enhanced professional development and related instructional materials for educators. Another goal is to develop a common notion about what is necessary to reach college and workplace readiness. Chair Kress promised that the input provided through this meeting will be reported to the full Commission.

Leaders in higher education and business were brought together to provide feedback on what researchers have found from examining the best college readiness practices from around the country. The discussion focused on crosswalks of standards developed by REL Southwest/EDVANCE Research, Inc. on behalf of the Commission. College faculty members provided their reaction to these standards, and business and civic leaders from around the state expressed their views about college and workplace readiness standards. As members were introduced, all expressed concern about students who are unprepared for postsecondary education and the workforce, particularly in math and science, and concern about the competitiveness of our workforce.

Meeting participants:

Sandy Kress, Chairman, Commission for a College Ready Texas  
Don Allen, Professor of Mathematics, Texas A&M University  
Peggy Brown, Professor of English and Humanities, Collin County Community College  
Rafael Caraveo, Greater El Paso Chamber of Commerce  
Drew Casini, Director, Texas Manufacturing Assistance Center  
Patti Clapp, Greater Dallas Chamber  
Randy Goodall, Sematech  
Beth Henderson, Academy of Medicine, Engineering, and Science of Texas  
Wes Jurie, Arlington Chamber of Commerce  
Jon Lee, Associate Professor of History, San Antonio College and member of CCRT  
Ron Lehman, Commissioner, Texas Workforce Commission  
Dean Nafziger, REL-Southwest/Edvance Research, Inc. and member of CCRT  
Margaret Reid, Associate Professor of Chemistry, Austin Community College  
Laurie Rich, Governor's Office  
Torrence Robinson, Texas Instruments  
Eric Rolffhus, REL-Southwest/Edvance Research, Inc.

Observers of the meeting:

Teri Flack, CCRT Consultant

Nancy Frank, CCRT Consultant

Evie Hiatt, Higher Education Coordinating Board

Joseph Kulhanek, Vertical Team Facilitator

Muffet Livaudais, TEA, Special Projects

Chris Patterson, CCRT Consultant

Melissa Oehler, Governor's Office

Jessica Right, REL-Southwest/Edvance Research, Inc.

Richard Rhodes, President El Paso Community College and member of CCRT

Cory Rountree, CCRT Consultant

Sara Weiss, CCRT Coordinator

Heather Zavotsky, University of Texas

## **Overview**

The discussion began with Dean Nafziger and Eric Rolfhus of REL-Southwest/Edvance Research, Inc. describing their efforts to compile standards from a variety of national sources. Dr. Nafziger stated that when they were asked to provide support to the CCRT with the intent to give support to the vertical teams, they found a great deal of material about college readiness. What they brought to the meeting were sets of standards that well-known, competent groups have developed to identify knowledge and skills that students need to be college ready. He indicated that there are similarities and differences, and concluded that the challenge is to make meaning out all of this information.

Dr. Rolfhus provided more detail about the standards. He said they were asked to identify and compare college readiness standards from several different sources and to determine what is common and what is unique. For English and math, they included four widely cited national college readiness standards:

- Achieve's American Diploma Project (ADP) standards. These standards were used as the benchmark for English and Math because they represent the broad view of college, as well as workforce readiness. Achieve surveyed business needs in developing their standards.
- The ACT's college readiness benchmarks.
- Standards for Success developed by Dr. David Conley.
- Standards developed by the College Board.
- ACT college readiness standards have empirical support and are very explicit.
- The College Board's standards are very likely Conley's standards.

They also examined state standards for California and Massachusetts; however, those standards were not included in the materials provided to the participants in the meeting.

The validity of the claims these standards make for college readiness vary. The College Board standards were not developed from an assessment perspective but from content. ACT standards are assessment specifications and look different from the other standards – so in one way the crosswalks compare apples to oranges.

Levels of specificity vary among the standards and pose challenges to the comparison. Comparing standards that are developed by different processes, however, offers convergent validity when all of the sources agree. Often, the sets of standards agree on the knowledge and skills needed for college readiness, but the level of specificity differs.

There is no evidence that any one set of standards is best, but the comparison offers a way to compare various standards that Texans can use in determining their college readiness standards. The goal of the crosswalks is to see how well these sets of standards line up and where specificity is provided. They help to identify where specificity is sufficiently defined to build content standards and assessments.

Dr. Rolfhus was asked to what degree these standards are predictive of college and workplace success? He responded that there is not a lot of predictive validity for most sets of college readiness standards – only empirically for ACT. ACT has done the best job linking standards with scores on the ACT test and college freshman course grades. They are the first organization to forge these links.

Standards in each discipline – Math, Science, and English -- were discussed, beginning with mathematics. Dr. Rolfhus created a summary document condensing the many standards into the 10-15 most important. The summaries for each of the disciplines are attached.

## **MATHEMATICS**

Dr. Rolfhus provided an overview of the Math standards. In particular, he described the knowledge/skills that appeared in every set of standards and the knowledge/skills which were included in some, but not all, of the standards (this could result from differences in specificity or rigor). All standards agreed that students need a fundamental understanding of Algebra I and II and Geometry. However, Dr. Rolfhus stated that most students do not leave high school with this knowledge.

Don Allen, Professor of Mathematics at Texas A&M University, provided his reaction and assessment of the standards.

- He stated that coming out of middle school the most important math knowledge and skills needed by students are fractions, functionality, problem solving, multiple representations, modeling, and manipulation skills.
- Fractions, problem solving and manipulation skills are the big three. A survey of college faculty indicated that these are the top three skills needed for college success.
- Of numbers and number sense, Algebra, Geometry, and data interpretation, Algebra is the key. Students lacking these skills almost always fail college and remedial courses.
- Students should know quadratic and linear functions completely.
- Problem solving is also key to math but should be taught across the core curriculum.

- Every standard fits into this framework. He agreed with the college readiness standards identified in the crosswalk. These skills are needed for technical work as well as higher education.
- He noted that college readiness is different for math different courses and different career paths. College readiness for a student whose first college math course is Algebra is different than a student whose first college math course is Calculus. Because students are arriving at college without Algebra readiness, the onramp of college math courses is changing.
- There is a profound disconnect between grade 12 and college.
- Accurate placement tests are a problem.
- We are now trying to determine college readiness by measuring motivation of students.

Dr. Allen was asked the difference between college algebra and algebra II in high school. He responded that they are very similar, but Algebra II is often used as remedial instruction to enable students to pass the TAKS. The result is that students may not learn as much of Algebra II as they need. High integrity Algebra II in high school should enable a student to take pre-calculus in college.

The balance of the math discussion involved all of the meeting participants. Throughout the discussion members made recommendations and comments relevant to the setting of workplace and college readiness standards. The recommendations are shown below in italics followed by relevant comments.

### **Recommendations and Comments**

- *Students need rigorous standards, knowledgeable teachers, high integrity in their high school math courses, realistic high school counseling all of the four years of high school, motivation to learn, independence in learning and persistence in studying.*
- *Problem solving is a key to college readiness.* It crosses all core subjects. How do we bridge these core competencies across the curriculum? We have to think about how knowledge is applied in the real world. Students need the ability to apply concepts and solve problems. A good working knowledge of Algebra is needed to position students for pre-calculus in college.
- *Students should be prepared for both college and the workplace – they should be considered as the same requirements.* The notion of applied mathematics is very important for workplace readiness. It's important for skills to be taught in high school, because some students do not go to college, and these students need these skills to enter the workplace. Physics is crucial for both technical education and jobs. I fear that expectations for those not going to college are not as rigorous, but should be as high as for those going to college.
- *Higher education and high schools must begin a dialogue so that standards, when adopted, are interpreted correctly.* The commission should address the disconnect between high schools' knowledge of what happens in college and vice

versa. If we want education to be seamless and integrated we must inform students what they do in public education leads to higher education.

- *Although there was no consensus in the standards included in the crosswalk that college readiness includes data interpretation, the participants agreed that data understanding is needed for college as well as work readiness.* It is essential for the first year of college.
- *Understanding the use of spreadsheets, such as Excel, is essential.* While several participants expressed the opinion that calculator usage was important (many students don't know how to use calculators, and this could be addressed in high school), they agreed that teaching Excel is more important than graphing calculators.
- *While in-depth statistics may not be necessary for all students, students need to understand some statistics.* The necessity for people to have the knowledge of statistics, especially for students who don't go to college is immense. When we talk statistics, students have to understand variation and how it occurs before entering the workforce and college. There was discussion about why colleges may not view statistics as critical to college readiness. The conclusion was that college statistics courses begin with the assumption that students have not statistical background. So there is no prerequisite knowledge of statistics. The consensus of the meeting participants was that statistical knowledge was important for a high school graduate entering the workforce.
- *It is important to consider the international/global market when looking at standards and knowledge and skills.* We must be careful about the way we draft the CCRT report to ensure that students are prepared for the global market place. Unless we do so, their ability to earn a living is diminished and the Texas economy will not be competitive.
- *High school requirements should be higher than Algebra II.* For students entering the workforce, this knowledge is helpful for an Associate's degree or vocational training, but not necessary for unskilled jobs.
- *Teacher education must be aligned with college readiness expectations.* Will there be teachers to teach higher math, and will there be course integrity? These are important questions to raise to policymakers. Problem is that many teachers teaching higher math in high schools do not have the preparation and skills to do so. Real Algebra, with high integrity and rigor, is needed to prepare all students for college. Decisions about teacher preparation and instructional materials will have to be addressed with the introduction of college readiness standards.
- *Maybe there should be recommendations for multiple performance standards for college readiness – a first level or minimum standard for a technical and vocational path and a second level or higher standard for university.* We need to be careful about defining college readiness. We say that we want every student to

be college ready but it is necessary to think about a range of readiness, or different tiers of college/career readiness. Maybe we need to define standards for each tier. However, we need to be very careful to avoid the possibility that students would be tracked into career paths.

- *Technology is a vital issue that must be addressed.* Students need to be able to use the computer. Digital fluency needs to be integrated into the classroom.

## SCIENCE

Dr. Rolfhus introduced the Science crosswalk with the statement that there is less agreement on science than math. The sub-disciplines of science make the identification of key standards difficult and complex. There are some knowledge and skills that should be taught across disciplines – such as math – but there is no consensus among the standards about what is fundamental across the disciplines as well as the different subjects/domains in science.

Although technology is included in the standards, the lack of specificity is common among the standards. Some topics, such as circuits and electricity, are important to some standards but not all. What math is essential to science is not identified. Science, in terms of cost and benefit, differs across the sets of standards. The benchmarks for science used in this crosswalk are the Standards for Success.

Margaret Reid, Associate Professor of Chemistry at Austin Community College, provided her reaction and assessment of the standards:

- In preparation for the meeting she sought input from fellow biology and chemistry faculty. They all agree that the fundamental skill is mathematical preparation beyond geometry with strong Algebra skills; students need exposure to Trigonometry and Precalculus.
- Algebra alone will not prepare students to be successful in college physics and chemistry.
- Understanding the scientific method is also essential but students often lack this skill.
- Critical thinking and problem-solving skills are important, and again often students lack these skills. Exposure to mathematics can help improve students' skills.
- Laboratory or hands-on science is additionally important for college science courses and often students lack this skill. Dr. Rolfhus acknowledged that laboratory skills are not evident in the ACT standards and that the scientific method is not prominent in the standards. Chair Kress asked Dr. Reid if there are any good existing standards for laboratory work or the scientific methods. Dr. Reid responded that AP placement exams are just beginning to test for laboratory knowledge and skills. He asked her to provide any information she can on good definitions or expectations for scientific method and laboratory skills.
- Computer literacy (word processing and spread sheets) is essential.

- Many students come to college unready to write appropriately, particularly to write about science.
- The knowledge and skills in the standards, such as the Periodic table, color spectrum, vectors, thermodynamics, are very important for success in college science courses.
- It is important that all of these knowledge and skills are taught, but we need to be careful to walk the line carefully between brevity and length.

Dr. Reid was asked what is the difference between high school and college chemistry? She responded that students taking AP chemistry do not need to take college chemistry. Students who take regular chemistry in high school need to take college chemistry because they do not learn enough of the basics to succeed in more demanding college chemistry courses. This highlights the importance of rigor and integrity in foundation courses.

### **Recommendations and Comments**

- *The CCRT report needs to indicate how sciences and technology converge and are integrated.* It is important for this to be taught in high schools. The rate of technology is changing so rapidly, teaching technology is very difficult. Because of the lead time need, by the time standards for teaching technology are prepared they will essentially be obsolete. The report should talk about methodologies used to convey knowledge, that technology is a basic competency. Participants questioned how this can be done because the world is changing in the blink of an eye. To begin with, we have to break out and admit that technology is fundamental to knowledge and to develop new ways of keeping the expectations of learning current.
- *Although the standards treat each discipline separately and distinctly, students need skill sets that cut across disciplines.* Part of science is understanding convergence and integration. Concern was expressed about the way courses are structured in high school and often in entry-level college courses with each discipline taught separately and discretely (characterized as silos). The ability of students to work across disciplines – such as in medicine and engineering – is increasingly valuable. This should be taught. The question was raised whether such cross discipline standards are available. One response was that the National Science Foundation has written about this articulation and convergence. It was suggested that perhaps students should learn the basics of chemistry and physics separately in high school but in addition should learn how these domains are integrated. One participant suggested that it is the “new stuff” that will excite students in science. Part of a discussion about preparing students for the international marketplace involves this discussion of integration. Other nations don’t necessarily silo different domains in science, but offer integrated science. It was suggested that the Commission look at international standards that integrate knowledge and skills of various science disciplines. It was acknowledged that the standards in the crosswalk are largely based on consensual, professional judgment that often is weak in informing us about cutting-edge matters in science.

- *A range of foundation skills should prepare students to move in multiple paths.* One example was an internship program that teaches the fundamental technological knowledge and skills common across the sciences. A suggestion was a six-week term in biology and/or chemistry that addresses the technology and the cross-functional skills that could be offered in high schools. But, if this is taught there must be a commitment to keep up with the changing technology.
- *Other knowledge and skills needed for success in college Physics courses include energy and power, electricity and magnetism and the nature of matter, and they should be taught in high school physics.* Students who go to college, particularly in STEM careers, will learn these important skills, but students who go directly into the workforce will not have the opportunity to learn these things, so it's important rudimentary knowledge that should be taught in high school.
- *Astronomy and astronomy principles are other cross-cutting science skills that should be included. One participant questioned why classical mechanics is not in the list of standards?*
- *Students need to understand science terms.* One respondent indicated that he didn't think there is a good understanding of science terms and that we need to prepare students to understand the terms basic to science.
- *Students pursuing STEM fields must take basic science courses in college if they want to continue in the sciences.*
- *The math standards use active words to describe the standards but science standards use inactive verbs such as "watching" and "knowing."* The science standards should be written in active words.
- *The challenge is giving students an introduction to life, making the academics understandable in the context of real world situations.*
- *Many of the knowledge and skills listed for science should be taught before a student enters high school.* In other words, students should be exposed to many of these knowledge and skills before they reach 9<sup>th</sup> grade. It was acknowledged that this list doesn't indicate when knowledge and skills are taught but only that students need to know these things before they graduate. Whether students are on the path for a technical degree, the workplace or a university degree, business must articulate what knowledge and skills are needed as the technology rapidly changes. Public schools need help in developing, refining and refreshing student expectations that meet today's needs. Recognizing that things will change and change quickly, we need to take the first step and identify the key things students need to learn today. The second challenge we must address is how students are taught and how to structure public education to keep up with rapid changes in our world. Many talk about cooperative efforts between high schools and college that seem to be successful in dealing with these issues.

- *We need an academic program that will prepare students to be successful and who will not need math or science remediation in college.* This is particularly true for those who intend to go into technical areas, such as RN, automatic mechanic, x-ray technician. Participants were solicited to list the knowledge and skills in science and math needed to prepare students for this path.
- *The number one concern businesses express is the impossibility of finding qualified or trainable workers. Businesses are looking for “soft skills.”* The main reasons why workers are terminated involve attendance, tardiness, insubordination, and the inability to work in teams. Academic knowledge and skills are not the fundamental requirements of employers: it’s these soft skills. It was suggested that habits of mind might cover some of these functions. The Vertical Teams have talked about these knowledge and skills.

## **ENGLISH/LANGUAGE ARTS/READING**

Dr. Rolfhus introduced the English/language arts/reading crosswalk. He indicated that grammar and punctuation are included in all of the standards. All of the sources of the standards on the crosswalk agree that students should write and write well, know how to create thesis statements, plan their writing before they start writing, have research skills, be able to gather appropriate resources, cite appropriately, analyze what they’ve read, recognize fallacies, understand word meaning (have the skills to find what words mean so they can use the right word). Students should be able to use evidence to make their arguments, revise based on their own and other’s feedback. They should be proficient with the Western culture canon of literature and know about poetry, prose, and drama.

Some, but not all of the sources included such standards as success with informational texts that integrate discipline; oral comprehension and presentation skills; the ability to write work-related materials; understanding cultural and historical contexts; differing logics based on contexts; understanding media technology; and an ability to work in self-directed teams.

Peggy Brown, Professor of English and Humanities, at Collin County Community College, provided her reaction and assessment of the standards:

- It is her experience that students don’t know how to structure sentences, and this is a universal shortcoming. Multi-lingual students are better at sentence structure. Learning Spanish would help students learn English.
- Part of the problem is that literatures from the past are uninteresting to students. Students like fast-paced, computer-based entertainment. There is nothing wrong with our high school teachers; however, they have not been taught grammar and sentence structure/mechanics in their training.
- There is no place to send students who have specific writing needs. Writing is a one-on-one learning process for those students who are struggling. There must be writing centers.
- Students must have:

- Reading skills – they are resistant to reading in class, and there is not enough classroom time during the day to develop critical skills. SQ3R reading skills treatment: survey and provide specific steps that they can follow: read, recite, and review.
- Structure – they must know the structure of a sentence from an independent clause. They must be able to take a logical idea through the completion of an essay.
- Grammar, punctuation, mechanics.
- Critical thinking – they must know how to read challenging texts and present main ideas. This must happen from grade school on. They must understand historical context. They must be able to interpret orally and establish theoretical connections. They must be able to write a written summary after discussion. They must be able to create an argument that explores the information they have and to find new information that is relevant to the argument.
- Better use of language – language is abused because of such things as texting and spell check.
- Students should be able to pick out the main ideas from a story/report. They must differentiate opinion from fact and they must be able to substantiate facts. Students are more able to express feelings than objective facts or logic. Students must be taught the larger context of literature. Students must be taught how to identify point of view, develop arguments, write persuasively for a specific audience, use figurative language, and follow appropriate forms. Too often students are taught to write according to a “five- paragraph formula.” High schools are letting students down by not teaching what is important in writing.
- Students have to know more – to understand, analyze, synthesize, and evaluate how thinking fits within the culture. On Bloom’s Taxonomy, the lowest level of thinking is gathering knowledge.
- It is incorrect to think that “soft skills” are not measurable. A seven-year study getting high schools and colleges together found that soft skills can be measured by portfolios. Students who used portfolios doubled their success in college.

### **Recommendations and Comments**

- *Reading is a fundamental skill.* It is not simply a matter of students not understanding what they read. In many cases, students don’t know how to read at all. It is impossible to teach students all of the things that have been discussed if they cannot read. It’s important to teach teachers how to read. One participant observed that the business world has better strategies for teaching knowledge and skills than schools of education. It is important to emphasize the importance of reading skills in the learning of math and science. Reading deficits represent the leading cause of academic problems across the disciplines. If students cannot read or compute, how can they acquire the knowledge and skills necessary for college and work? Reading is the most important skill. If students cannot read with comprehension by the third grade, they are likely to drop out. CCRT should weave into the report a comprehensive approach to better educating all students.

- *Technical reading and writing are not included in the standards.* Technical reading and writing are very important. Some may think these skills are more important than reading poetry; however, others suggest that all of the things being discussed are evident in Shakespeare's writing.
- *World comprehension, the ability to use work-related terms, resumes, cover letters, analyzing, synthesizing, the ability to work in teams, all of these soft skills should be taught through English Language Arts.* Students should be able to read a manual and demonstrate an ability to perform a skill, students should be able to read a college textbook in science or math with comprehension, students should be able to write a resume.
- *The demonstration of ability to work in teams without direction is essential.* Achieve's ADP standards do include some of these skills that are not included in ACT and academic standards.
- *Concern was expressed about how students can be taught grammar when they depend on text messaging and email as their primary form of communication.* By using the medium as a forum to evaluate their writing, teachers can ask students to use text messages as the basis for translating into proper communication for a different audience. College faculty are trying to change how they teach reading and writing. There are pilot programs in the Army, using gaming theory, to teach knowledge about terrorism that are interactive. These programs can be downloaded and made widely available. Using these types of tools may engage students in a way that leads to better learning outcomes. Examples of reading from the Internet should supplement textbooks.
- *Comprehension skills are important.* All employees need to be taught how to read with comprehension and write succinctly.
- *Students must understand how to move from text messaging to bullet communication and crisp speech.* Power Point may be helpful because it can help students organize their thoughts. Although someone who has never written a story would have great difficulty developing a Power Point presentation. Achieve (ADP) has the most specific standards on informational text across subject areas.

## **SOCIAL STUDIES**

Although a Social Studies crosswalk was not available at the time of the meeting, Chair Kress asked Jonathan Lee, Co-Chair of the Social Studies Vertical Team, to provide the participants with the highlights of the Vertical Team's thinking about social studies standards.

Dr. Lee provided a high-level view of the work of the Social Studies Vertical Team:

- No one has ever tried to create standards for Social Studies. That's why there is no crosswalk yet available.

- Technology is important but not as important as the ability to read and understand what's read.
- While Social Studies covers many different disciplines they are all inter-related. It is impossible to study one field without information from other fields. For example, to understand history you also have to understand geography and political science. It also involves reading, writing, analyzing information, and understanding diverse perspectives.
- You seem to be saying you want more specific standards, and we think things are too specific.
- If you're talking about global competitiveness, it is important for your workers to understand the world, you would want your employees to understand the history and culture of other countries and nations. What do you want to see taught in social studies to improve our competitiveness in the global marketplace?
- It is important to hear from the business community what you think about social studies.

### **Recommendations and Comments**

- *Economics should play a larger role in social studies.* Today's generation has greater economic responsibility than the previous generation and students must be prepared to take more responsibility for their welfare. The economic issue – why do we want more STEM students – is not known or understood by students today. Students need to know the global challenge the U.S. faces today. Students would do better in college if they knew how the world works. Students should know how a company works – rudimentary knowledge about the world – what capitalism means, explaining why a business plan is essential to a business' success even if they are pursuing a STEM field. Students need to understand the context in which they live. Businesses need this kind of criteria for social studies. Students need to be given a global economic context and the challenges they will face from China and other nations. What does the world stage look like, how is our culture different from others? This is the kind of knowledge students need today.
- *It is important to understand cultural differences.* It's a huge problem when people in the workplace don't understand cultural differences.
- *Rethink the way history is taught.* College American history courses assume no prior knowledge of American history, but all students take history in high school. What is essential in U.S. history in high school should be addressed.
- *Technology has a role to play.* There are many technological tools that can be used in geography to provide visual images and to report on people and places.
- *It is important to examine the concepts of civic values, principles, and beliefs, to explain why government is necessary, to evaluate major debates of past events.*
- *Students today need a second language.*

- *Students need to communicate clearly.* There is a higher level of expectations now.

## **Conclusion**

Chair Kress thanked all of the participants and ask them to think about ways to keep this discussion going. He explained that this is about teachers, curriculum, and instruction – not just standards.