

What Does Engineer
Office Manager **It** **Really**
Lab Technician **Mean**
Teacher **to Be** **Biotechnology**
Criminal Justice **Nursing** **College**
General Studies **Programmer** **IT and** **Nurse** **Automechanic**
Accounting
Business **Work** **Researcher**
Auditor **Ready?** **Early Childhood Education**

EXECUTIVE SUMMARY

*The Mathematics and English Literacy Required
of First Year Community College Students*



EXECUTIVE SUMMARY

What Does It Really Mean to Be College and Work Ready?

*The Mathematics and English Literacy
Required of First Year
Community College Students*

A Report from the National Center on Education and the Economy

May 2013



The National Center on Education and the Economy was created in 1988 to analyze the implications of changes in the international economy for American education, formulate an agenda for American education based on that analysis and seek wherever possible to accomplish that agenda through policy change and development of the resources educators would need to carry it out.

National Center on Education and the Economy

2000 Pennsylvania Avenue, NW
Suite 5300
Washington, DC 20006
(202) 379-1800
www.ncee.org

Copyright © 2013 by the National Center
on Education and the Economy

DEAR COLLEAGUE

The nation is, at long last, engaged in a serious discussion of what it might take to make sure that our students leave high school college and career ready. But what exactly, does that mean? Almost three years ago, we decided to find out, by looking at the levels of mathematics and English language literacy high school graduates need to succeed in their first year in our community colleges.

Why focus on community colleges? About 45 percent of US college students are in these institutions. They provide most of the vocational education done in this country, and are therefore the main gateway to work requiring solid training, but not a four-year degree. Half of the students in these institutions are in programs designed to enable them to transfer to four-year colleges. So community colleges are also a main pathway to four-year colleges. Since a large fraction of community college students enrolled in the general studies track go on to four-year colleges, it is clear that for a substantial majority of high school graduates, being ready to be successful in the first year of a typical community college program is tantamount to being ready for both college and work.

There was, of course, no shortage of opinions about what it might take to succeed in the first year of community college, but much of it was based on asking panels of college faculty for the answer. This method of determining education standards, however, is notoriously faulty, because educators, job foremen and others presumably in a position to know typically answer based on what they would like students and workers to know and be able to do,

not what the program of study or the work actually requires. We quickly discovered that no one had done in-depth research on what was needed to be successful in our community colleges.

So we set in motion two empirical studies, one focused on English and the other on mathematics requirements. The results run counter to some widely held opinions that turn out to be just plain wrong in the light of our findings.

But these findings will not surprise everyone. As the facts presented in these reports came to light in the course of our research, we shared them with people very close to the institutions we were researching. Few of them were surprised. Most told us that the emerging picture corresponded closely to what they saw every day in the field. They had long ago concluded that the debate about standards was unhinged from the realities in our community colleges.

We offer these research reports in the hope that our findings will enable our schools to make the changes in school curriculum and instruction needed to enable our students to be much more successful in

college and in the careers they choose for themselves. But there are important implications here for the Common Core State Standards, for community colleges and for the institutions that educate and train our teachers as well as for employers.

Some may say that our findings constitute an argument to lower high school leaving standards. That would be a gross misreading of our findings. For most of our students, those “high” standards in mathematics constitute a requirement to learn material they will never need, either in college or later in their work, a bit like the requirement a century ago to learn Latin in high school. A fair reading of these reports will conclude that, both in English literacy and mathematics, both the schools and our community colleges will have to help their students reach for different kinds of targets and, at the same time, achieve at much higher levels than they do now.

Many will be very surprised at how little is actually demanded of our first year community college students. The natural reaction would be to call for raising the standards in our community colleges substantially. But we would urge caution here. They must, over time, be raised—greatly raised in fact—but it is very important to bear in mind that a large fraction of high school graduates cannot now do the work required of them in the first year of the typical community college program. Our first priority should be to enable all high school students to succeed against the current community college standards, before we raise the bar even further.

What these studies show is that our schools do not teach what their students need, while demanding of them what they don't need; furthermore, the skills that we do teach and that the students do need, the schools teach ineffectively. Perhaps that is where we should begin.

Each of these studies was guided by a panel of leading experts in that subject matter area, including key figures from the community colleges themselves, as well as leading subject matter experts and researchers. Both studies were overseen by our Technical Advisory Committee, whose members include many of the nation's leading psychometricians, cognitive scientists, and curriculum experts. We are deeply indebted to both the subject matter Panels and the Technical Advisory Committee for the time and careful attention they have given to these studies over the two-and-a-half years it has taken to conduct them. Special appreciation goes to the Mathematics Panel co-chairs, Phil Daro and Sol Garfunkel and the English Panel co-chairs, Richard P. Durán, Sally Hampton and Catherine E. Snow, for their leadership, thoughtfulness and creativity in steering these Panels through the challenging tasks we set before them.

Most of the work, as is usually the case, was done by the staff. Betsy Brown Ruzzi, NCEE's Vice-President for Programs, produced the original research design and has continued to be deeply involved in the work. Jackie Kraemer, Senior Policy Analyst, conducted the research. Jennifer Craw, Production Designer and Webmaster, assembled and aggregated all the data coding and developed the data displays. David R. Mandel, Director of Research and Policy Analysis, oversaw the whole process and played a key role in drafting the reports. And many thanks to Suzie Sullivan, Director of Administration, for her keen eye as we prepared the report.

We are deeply grateful for the support and encouragement of the Bill & Melinda Gates Foundation, which funded this effort as part of their College Ready Education strategy.

Marc Tucker, President
National Center on Education and the Economy

I. SUMMARY

THERE IS A STRONG CONSENSUS that students ought to leave high school ready for both college and careers. But what, exactly, does that mean? As far as we know, this report is the result of the first attempt to answer that question with empirical research.

We focused that research on the requirements of community colleges, because, by doing so, we can provide a very concrete image of what it means to be “college and career ready.” A very large fraction of our high school graduates attend these institutions, which some have described as the workhorse of our postsecondary education system. Our community colleges provide not only a gateway to the nation’s four-year colleges for a large and increasing fraction of our students, but also the bulk of the serious vocational and technical education taking place in the United States below the baccalaureate level, for everyone from auto mechanics and nurses to emergency medical technicians and police officers. If a student cannot successfully complete a community college two-year certificate or degree program leading directly to such a job, that student will have a very hard time supporting a family above the poverty line. So it is reasonable to say that if a student leaves high school unable to succeed in the initial credit-

bearing courses in their local community college, that student is ready neither for work nor college. And we know that, in fact, a large proportion of our high school graduates are indeed unable to succeed in their first year in community college. So this report addresses a simple question: **what kind and level of literacy in mathematics and English is required of a high school graduate if that student is going to have a good chance of succeeding in the first year of a typical community college program?**

One would think that the answer to that question would be well known, but it is not. **Community college staff have been asked for their opinions on that point, but people who study the process of setting standards of this sort know that, irrespective of how they are instructed, people who are asked such questions typically answer based on what they would like students to know and be able to do, rather than on what the actual work demands.**

We present here an empirical analysis of the mathematics and English literacy skills needed in a range of initial required community college introductory courses in a diverse range of programs of study.

We began this research by randomly selecting a community college from each of seven states and then focusing on the most popular and diverse programs in those colleges - Accounting, Automotive Technology, Biotech/Electrical Technology, Business, Criminal Justice, Early Childhood Education, Information Technology/Computer Programming¹ and Nursing - plus the General Track.²

For mathematics, we collected data on the mathematics that are actually taught in the initial credit bearing courses in those programs, and in the

initial mathematics courses these programs require students to take. We did this by analyzing the textbooks and exams and other work assignments used in these courses. For English, we collected materials, including graded student assignments, tests and examinations from each college to allow us to analyze the reading and writing skills that are required in the initial credit-bearing courses in those programs, and in the first year English Composition course required by each program. We also analyzed the reading levels needed to understand the material in the textbooks used in those courses.

¹ While there are distinct differences in the curricula of the Information Technology and Computer Programming courses we encountered, the character of the texts they employ are quite similar so they have been joined together for analytical purposes.

² About one-third of community college students who graduate choose to major in the liberal arts and sciences, general studies and/or humanities, a figure that has remained steady over the last decade. The next most popular majors are in the health professions and related clinical sciences, which encompass about 21% of all associate degrees granted. Business is another popular major, drawing 15.7% of community college students, followed by engineering at 6.5%. Security and protective services and computer and information services round out the most popular majors with 4.4% and 3.8% of students choosing these fields, respectively. While health fields have experienced an increase in graduates between the 1999-00 and 2009-10 school years (from 15.3% to 20.9%), engineering has dropped from 10.5% of graduates to just 6.5%. Most other fields have remained fairly stable. (NCES, *Condition of Education, 2012*, (2012). Washington, DC)

THE FINDINGS FOR MATHEMATICS LITERACY

ONLY ONE PROGRAM in one college required entering students to have mastered the content of Algebra II before enrolling in that program. Algebra II is an integral element in the sequence of mathematics courses that are required of students who will go on to take calculus and to use calculus in their work, but that is true of only about five percent of the working population.³

Indeed, community college first year programs of study typically assume that students have not mastered Algebra I. The most advanced mathematics content used in the vast majority of the first-year college programs we analyzed can reasonably be characterized as the mathematics associated with Algebra 1.25, that is some, but not all, of the topics usually associated with Algebra I, plus a few other topics, mostly related to geometry or statistics. Most of the mathematics that is required of students before beginning these college courses and the mathematics that most enables students to be successful in college courses is not high school mathematics, but middle school mathematics, especially arithmetic, ratio, proportion, expressions and simple equations.

Considering the importance of middle school mathematics content, it should be of real concern that a large proportion of our high school graduates do not have a sound command of this fundamental aspect of mathematics. We also found that many

³ See Anthony P. Carnevale, Nicole Smith and Michelle Melton, *STEM* (Washington, DC: Center on Education and the Workforce, Georgetown University, 2011)

students, to be successful in our community colleges, need to be competent in some areas of mathematics that are rarely taught in our elementary or secondary schools, such as schematics, geometric visualization and complex applications of measurement.

In sum, a substantial part of the high school mathematics we teach is mathematics that most students do not need, some of what is needed in the first year of community college is not taught in our schools, and the mathematics that is most needed by our community college students is actually elementary and middle school mathematics that is not learned well enough by many to enable them to succeed in community college. A significant body of research on teacher knowledge, including the work of Liping Ma, Jim Stigler and Deborah Ball, makes it clear that one reason for this is because the instruction in arithmetic, ratio, proportion, expressions and simple equations that our teachers have received in school and in college falls far short of what it needs to be for them to have a sound conceptual grasp of the mathematics they are asked to teach.⁴

⁴ A recent addition to this body of knowledge that examines what developmental mathematics students in community college actually understand about mathematics (James W. Stigler, Karen B. Givvin and Belinda J. Thompson, "What Community College Developmental Mathematics Students Understand about Mathematics," *MathAMATYC Educator*, v1 n3 (May 2010): p 4-16) reinforces prior findings that the dominance of attention to procedure in K-12 mathematics education accompanied by lack of focus on conceptual understanding contributes significantly to students struggling with middle school mathematics and early algebra in college.

We conclude the following:

1. Many community college career programs demand little or no use of mathematics. To the extent that they do use mathematics, the mathematics needed by first year students in these courses is almost exclusively middle school mathematics. But the failure rates in our community colleges suggest that many of them do not know that math very well. A very high priority should be given to the improvement of the teaching of proportional relationships including percent, graphical representations, functions, and expressions and equations in our schools, including their application to concrete practical problems.
2. Whatever students did to pass mathematics courses in middle school, it does not appear to require learning the concepts in any durable way. While they may have been taught the appropriate procedures for solving certain standard problems, the high rates of non-completion by the significant percentages of students who arrive at college with the most modest command of mathematics suggests that there are significant weaknesses in teaching the concepts on which these procedures are based. This is a very serious problem that needs to be addressed in the first instance by the way mathematics is taught to prospective teachers of elementary and middle school mathematics in the arts and sciences departments of our universities and the way mathematics education is taught in our schools of education.
3. It makes no sense to rush through the middle school mathematics curriculum in order to get to advanced algebra as rapidly as possible. Given the strong evidence that mastery of middle school mathematics plays a very important role in college and career success,⁵ strong consideration should be given to spending more time, not less, on the mastery of middle

school mathematics, and requiring students to master Algebra I no later than the end of their sophomore year in high school, rather than by the end of middle school. This recommendation should be read in combination with the preceding one. Spending more time on middle school mathematics is in fact a recommendation to spend more time making sure that students understand the concepts on which all subsequent mathematics is based. It does little good to push for teaching more advanced topics at lower grade levels if the students' grasp of the underlying concepts is so weak that they cannot do the mathematics. Once students understand the basic concepts thoroughly, they should be able to learn whatever mathematics they need for the path they subsequently want to pursue more quickly and easily than they can now.

4. Mastery of Algebra II is widely thought to be a prerequisite for success in college and careers. Our research shows that that is not so. The most demanding mathematics courses typically required of community college students are those required by the mathematics department, not the career major, but the content of the first year mathematics courses offered by the community colleges' mathematics department is typically the content usually associated with Algebra I, some Algebra II and a few topics in geometry. It cannot be the case that one must know Algebra II in order to study Algebra I or Algebra II. Based on our data, one cannot make the case that high school graduates must be proficient in Algebra II to be ready for college and careers.

The high school mathematics curriculum is now centered on the teaching of a sequence of courses leading to calculus that includes Geometry, Algebra II, Pre-Calculus and Calculus. However, fewer than five percent of American workers and an even smaller percentage of community college students will ever need to master the courses in this sequence in their college or in the

⁵ See Stigler, Given and Thompson and the findings of the mathematics gaining the greatest attention in the community college majors that comprise the heart of this study.

workplace.⁶ There is a clear case for including the topics in this sequence in the high school curriculum as an option for students who plan to go into careers demanding mastery of these subjects, but they should not be required courses in our high schools. To require these courses in high school is to deny to many students the opportunity to graduate high school because they have not mastered a sequence of mathematics courses they will never need. In the face of these findings, the policy of requiring a passing score on an Algebra II exam for high school graduation simply cannot be justified.

5. Our research shows that many of the most popular community college programs leading to well-paying careers require mathematics that is not now included in the mainstream high school mathematics program, including mathematical modeling (how to frame a real-world problem in mathematical terms), statistics and probability. Our research also shows that success in many community college programs demands mastery of certain topics in mathematics that are rarely, if ever, taught in American elementary and secondary schools, including complex applications of measurement, geometric visualization and schematic diagrams. American high schools should consider abandoning the requirement that all high school students study a program of mathematics leading to calculus and instead offer that mathematics program as one among a number of options available for high school students in mathematics, with other options available (e.g., statistics, data analysis and applied geometry) that include the mathematics needed by workers in other clusters of occupations. By doing so high schools will almost certainly expand opportunity to many students who now find success in college closed off by a one-size-fits-all sequence of mathematics topics that actually fits the requirements only for a very narrow range of occupations.

⁶ See Anthony P. Carnevale, Nicole Smith and Michelle Melton, *STEM* (Washington, DC: Center on Education and the Workforce, Georgetown University, 2011) for their forecast of the growing percentage of STEM jobs, not all of which will require calculus.

6. The research we did revealed a major gap in the alignment between the mathematics courses taught in the mathematics departments in our community colleges and the mathematics actually needed to be successful in the applied programs students are taking. In some of the cases we observed, the departments offering the applied programs apparently felt compelled to create their own mathematics courses rather than require a course in the mathematics department. In a great many cases, the mathematics department course had little or nothing to do with the actual mathematics required to be successful in the applied programs the students were enrolled in. It may well be that many community college students are denied a certificate or diploma because they have failed in a mathematics course focused on mathematics topics that are irrelevant to the work these students plan to do or the courses they need to take to learn how to do that work. That strikes us as unfair. Because this is true and because we also noted that students in the applied programs often need mathematics that was never offered in high school or in college, we think the community colleges need to review their mathematics requirements in the light of what has been learned about what students need to know about mathematics to be successful in the careers they have chosen.
7. Like the standard high school mathematics sequence, the placement tests that community colleges use to determine whether students will be allowed to register for credit-bearing courses or be directed instead to take remedial courses in mathematics are based on the assumption that all students should be expected to be proficient in the sequence of courses leading to calculus, in particular that they should be expected to be proficient in the content typically associated with Algebra I, Algebra II and Geometry. But our research, as we have noted, shows that students do not need to be proficient in most of the topics typically associated with Algebra II and much of Geometry to be successful in most programs offered by the community colleges. This is a very serious issue. It is clear that many students are

being denied entry to credit-bearing courses at our community colleges who are in fact prepared to do the mathematics that will be required of them in their applied programs.

A very large proportion of students who enroll in remedial programs fail to get a degree or certificate, whether or not they complete their remedial programs. It follows that a large fraction of students applying to our community colleges are needlessly running up debt taking remedial courses they do not need to take to be successful in the applied programs of their choice, and are, in the process, being denied access to the programs that could make all the difference between rewarding careers and lives on the one hand and lives of poverty and frustration on the other. The research showing that many students who fail their placement tests in mathematics, but go on to be successful in community college, makes the point.⁷

8. While the textbooks in the introductory program courses were often impressive in their demand for mathematical thinking, the tests were a different story. Judging by the tests community college teachers administer to their students in the introductory program courses in their career majors, their courses are typically pitched to the lower set of expectations described by Bloom's hierarchy—memorization of facts and mastery of procedures—and not to the kinds of analytical skills, writing ability, ability to synthesize material to put together solutions to problems the student has not seen before,

and other complex skills that employers are now demanding. Community colleges need to review their course and program objectives in the light of current employer demands to make sure that they are helping their students develop the kinds of skills that will make their graduates employable.

9. What is tested by community college instructors typically falls far short of what is contained in the texts those teachers assign to their students. Judging by what is tested by community college teachers, they do not typically appear to be requiring students to apply mathematics or even to think mathematically when the text they have chosen for the courses uses math to explain relevant phenomena or presents mathematical skills as an important element in the skills required to do the work. It is not clear whether this is because the teachers do not think that that material is in fact needed to be successful in the field the student has chosen or because, although they do think it is needed, they do not think their students capable of learning the material. This, too, is a very important issue. If it is the case that many community college teachers are teaching less material than they think is actually needed or teaching material at a lower level than they think the work actually demands, because they do not believe their students can absorb the material they actually need to absorb, then our community colleges are shortchanging our students and this problem needs to be addressed.

⁷ Clive Belfield and Peter M. Crosta, *Predicting Success in College: The Importance of Placement Tests and High School Transcripts*, (New York: Community College Research Center, 2012) and Judith Scott Clayton, *Do High Stakes Placement Exams Predict College Success?* (New York: Community College Research Center, 2012).

THE FINDINGS FOR ENGLISH LITERACY

WE FOUND THAT the reading and writing currently required of students in initial credit-bearing courses in community colleges is not very complex or cognitively demanding. While the information load of texts students encounter in community colleges is considerably more demanding than of those assigned in high school, students are not expected to make much use of those texts. The requirements for writing are marginal at best and the performance levels students are expected to meet with respect to reading are in many cases surprisingly modest.

It turns out that the reading complexity of college texts used in initial courses in community colleges is somewhere between the level of grade 11 and grade 12. One would think that this means that the level of the community college texts is comparable to the level of a student's high school text and would therefore present no challenge to their reading ability. But that does not seem to be the case. Two things point in this direction. First, the high failure rates that students experience in community college suggest that these texts are too difficult for many of them to handle. Second, there are an accumulating number of studies of high school texts that point to their diminished level of challenge over the past half century at the same time as the demands of college texts are holding steady or increasing.⁸ Taken together they suggest that high school students typically confront texts that fall short of those rated at grade 11 or 12.

⁸ ACT, *ACT National Curriculum Survey* (Iowa City, IA: ACT, 2009). Common Core State Standards Initiative (2011). *Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects, Appendix A: Research Supporting Key Elements of the Standards*. Washington, DC: National Governors Association Center for Best Practice and Council of Chief State School Officers.

Our text complexity study noted that students who will be successful readers of information-rich texts written at the 11th or 12th grade level must possess the following capacities:

- The ability to read complex texts in unsupported environments;
- The capacity to process, retain and synthesize large amounts of new information;
- Significant reading experience in a wide range of content areas; and
- The ability to read and understand tables, charts, maps, lists and other documents that supplement the prose in many college texts.

Many students emerge from high school without these capacities and experiences because reading for in-depth subject matter comprehension is not formally taught in most high schools and the reading that is required more often than not demands little more than searching for basic facts as opposed to trying to make sense of complex or conflicting ideas or both. The reading that is assigned in high schools is also drawn from much less complex texts than are found in community college, particularly in college courses focusing on technical areas such as information technology and automotive technology. Texts in these fields require the ability to read and understand technical vocabulary, charts and other visual representations of physical and mechanical phenomena not typically taught in high school outside of career and technical education courses. In many cases it is not that students might not come across such material, it is that they are rarely called on to engage with it. This disconnect between high

school and college reading demands is particularly troubling and suggests a need to reexamine what is taught in high school. The Common Core State Standards in English Language Arts (CCSSE) address reading in history/social studies as well as science and technical subjects, and in so doing may increase the relevance of high school instruction.

While the reading complexity of first-year community college texts is between 11th and 12th grade levels, we found that community college instructors typically make limited use of the texts they assign and use many aids (e.g., PowerPoint presentations, videos, outlines, flashcards) to help students understand the key points of the sections of the text they are asked to read. It would appear that students' inability to read texts of the level assigned does not inhibit their success in their programs. Is this because the material in the texts is irrelevant to later success in education and careers, or because the instructors offer workarounds, recognizing their students' limited reading ability?⁹

The Programme for International Student Assessment (PISA) analytical framework used by the study's English Panel to analyze the level of reading challenge makes a distinction between retrieval tasks – those that require a reader simply to find information and make basic interpretations of it – and analytic/synthetic tasks, that require the reader to reflect on and evaluate what they have read.

Overall, we found that most of what first-year community college students are required to do falls in the former category. Only the English Composition classes reliably assign tasks that require students to reflect on and evaluate what they have read.

The study also analyzed the reading and writing requirements found in tests and examinations in initial credit bearing community college courses. In this case, we found that most assessments in community colleges come in the form of multiple-

choice questions that demand very little in the way of complex reading skills and no writing.

Our analysis of the writing required to succeed in initial credit bearing courses in community college revealed that most introductory college classes demand very little writing; when writing is required, instructors tend to have very low expectations for grammatical accuracy, appropriate diction, clarity of expression, reasoning and the ability to present a logical argument or offer evidence in support of claims.

To the extent that writing is required in initial credit-bearing courses, it typically takes the form of informational writing or marshaling evidence for taking a particular course of action tied to a course-relevant profession. For example, filling in an auto repair order form, completing a pre-school class observation form, reporting engine analysis findings, writing up treatment notes for a nursing patient, or making an argument for taking a particular action on the basis of criminal justice system data. But this kind of writing gets the most modest attention in high schools, where literary analysis plays a significant role. However, even more worrying than how the balance is struck between different forms of writing in high school is that so little writing of any kind is assigned. Across various content area classes, the default is short form assignments that require neither breadth nor depth of knowledge. Furthermore, the quality of instruction, especially with regard to argument, falls far short of what students need.¹⁰ The good news here is that the CCSSE has recognized this problem and set out to address it by spelling out a much more ambitious approach to teaching writing, starting in the elementary grades and extending into secondary schools. But applauding new standards is not the same as enacting them. Serious attention at the state and local level to bridging the gap between where we are and where we need to be must follow and this should include greater attention to writing in teacher education programs across the board.

⁹ One explanation of what is occurring is that there has been an element of "pedagogical surrender" occurring on college campuses. Where once (mid-'80s to late '90s) they taught to "the middle," now they teach to "the base."

¹⁰ Applebee, A. N. and Langer, J. A. (2011). A Snapshot of Writing Instruction in Middle Schools and High Schools, *English Journal*, 100.6: pp. 14-27.

With the exception of English Composition classes, complex writing plays a minor role in community college student exams. When writing is assigned in exams, the emphasis in grading is on the least cognitively demanding aspects of writing. At almost every turn one finds the weakness of high school writing being reinforced in community colleges when just the opposite ought to be the order of the day. Taken together this suggests that community college could be a much more rewarding experience for students were it not for the weak preparation that precedes college and the modest expectations students encounter during their stay.

We have noted that community college instructors do not expect their students to be able to read at the level of their texts or to write very much at all, suggesting that those instructors have very low expectations for their students, expectations so low as to deny many, if not most, students the opportunity to learn skills essential to the careers they have chosen to pursue. Conversely, we have also pointed out that nothing in the high school curriculum prepares students for some of what is expected in our community colleges.

This study of initial credit-bearing courses in community colleges suggests that only modest reading and writing demands are placed on students in these courses. While texts assigned include content at about an 11th or 12th grade reading level, which is significantly more challenging than what they typically encounter in high school, the level of processing of those texts required by the assigned tasks is, at best, only modestly challenging in most courses. The one exception was English Composition, where high challenge levels are common. Students in the community colleges we studied are asked to retrieve information and sometimes integrate information from different texts in their writing, but only a few courses, outside of English Composition classes, ask students to reflect on and analyze what they read.

Reading and understanding technical vocabulary is a necessary skill in many of the initial credit bearing courses analyzed. While students will not likely encounter such vocabulary in high school, experience

in high school with navigating texts in unfamiliar subjects, including texts that contain technical vocabulary of some type, would better prepare them for the demands of college. Consistent with this idea is identification by the CCSSE of reading in technical subjects as an important learning objective. Consequently, placing some greater emphasis on literacy with graphical representations and other technical means of communication seems like a sensible strategy for high schools to consider.

English Composition courses in our community colleges focus on teaching students the different genres of writing needed in college, but many of the courses specific to the industry clusters never give any writing assignments or assign types of writing that might help students develop the writing skills needed for that industry. In addition, far too many of these classes rely primarily on multiple choice tests to assess students' command of knowledge, thus communicating that writing ability is not really needed. Aside from sending a false signal to students, this shouldn't be read as an excuse for anyone being satisfied with the meager amount of writing students are assigned in high school. In the first instance, most students will be taking an English Composition course and not giving adequate attention to writing in high school is a recipe for trouble in this course and in subsequent college courses students might take. Secondly, it is a recipe for trouble in the workforce and for participation in civil society.

We found considerable evidence suggesting that many of the deficits of secondary school language arts instruction are being replicated rather than remedied in community college teaching. The writing tasks assigned in these community college programs are of low challenge, students' writing skills are rarely assessed, and expectations for student writing, especially of arguments, are low. Our community college students clearly need better instruction in constructing arguments and in laying out their thinking logically and persuasively. Such writing is at the heart of learning in college to say nothing of its essential role in many workplaces. It pushes students to gain command of the subjects they are studying, to think critically about the

strengths and weaknesses of different points of view, to anticipate counterarguments, and to express their findings clearly and persuasively. The target for student competence in this aspect of literacy in both our high schools and colleges needs to be raised if our students are to have a future with promise that they all deserve. The call of the Common Core State Standards for strengthened instruction in this area is a sound first step in this direction.

A Final Note

The response that many of our readers would no doubt expect from the Panels that helped produce this study is to demand that community colleges raise their expectations for students in mathematics, reading and writing at least to the point that students be expected to read the texts they are given, do the mathematics presented in those texts and write material appropriate to the careers they have chosen at a level that goes beyond the simplest recall of facts to embrace the kinds of analysis expected of them on the job. And further, that the high schools be expected to prepare these students to meet such standards and to provide the foundation skills required for their graduates to exercise the skills for which currently no foundation is provided in high school.

Yes, but a note of caution is in order. We need to bear in mind that a very large fraction of high school graduates does not meet the very low expectations that community colleges currently have of them. The nation may have to learn to walk before it runs, which means that it is important, first, to enable our high school students to meet the current very low standards before we ratchet those standards up. Nothing in this stance, however, should prevent high schools from providing the skills needed to do the kind of mathematics, reading and writing now demanded by our community colleges for which no foundation is currently provided. Nor should it prevent community colleges from assigning more writing in those cases in which it now assigns none, or from asking students to read material which is

vital to their mastery of the initial skills their future employers will require.

The issues revealed by this study are clearly not limited to the low standards for mathematics and English literacy in our high schools. There is a striking mismatch between the kind of literacy skills demanded for success in college and careers and the curriculum in our schools. Some of this mismatch is addressed by the new Common Core State Standards. As such, the standards represent a promising first step in righting this ship, but their faithful implementation will likely be a heavy lift for our schools, and even if successfully executed, offer no guarantee of fully addressing the many shortcomings identified by this study. Parallel initiatives on the community college front are also in order as is a commitment to build on this initial research to deepen our understanding of the issues at hand and to track the results of the most promising efforts that may be mounted to address the shortcomings identified here.

This report will be jarring for many. Our findings paint a very different picture of the actual standards for success in our community colleges than many have been carrying around in their heads. While we are confident that our research techniques have enabled us to produce a much more accurate picture of those standards than the nation has ever had before, we do not regard this report as the last word on the subject. We would welcome studies that include a much larger random sample of colleges, take a closer look at colleges with outstanding reputations and gather a larger sample of the materials used in courses as well as student work. We think it would be worthwhile to do case studies of community colleges, looking in more detail at classroom practices and interviewing instructors to better understand why they are not making full use of the texts they assign and gauge their own sense of their students' needs and limitations. It is not unusual for researchers, in their reports, to call for more research, but we do believe that, in this case, more research could pay large dividends.

MATHEMATICS PANEL

Philip Daro, *Co-Chair*

Director, Strategic Education Research
Partnership – San Francisco
Senior Fellow, Mathematics
Pearson - America's Choice
Berkeley, CA

Solomon Garfunkel, *Co-Chair*

Executive Director
Consortium for Mathematics and Its Applications
Bedford, MA

John T. Baldwin

Professor Emeritus, Department of Mathematics
and Statistics
University of Illinois at Chicago
Chicago, IL

Patrick Callahan

Co-Director of Special Projects, California
Mathematics Project
University of California, Los Angeles
Los Angeles, CA

Andrew S. Chen

President
EduTron Corporation
Winchester, MA

Wade Ellis, Jr.

Instructor of Mathematics (ret.)
West Valley College
Saratoga, CA

Robert L. Kimball, Jr.

Head, Mathematics and Physics Department (ret.)
Wake Technical Community College
Raleigh, NC

Lucy Hernandez Michal

Professor, Department of Mathematics
El Paso Community College
El Paso, TX

Geri Anderson-Nielsen

Independent Consultant
Washington, DC

Lisa Seidman

Professor, Department of Biotechnology
Madison Area Technical College
Madison, WI

Colin L. Starr

Chair, Department of Mathematics
Willamette University
Salem, OR

ENGLISH PANEL

Richard P. Durán, Co-Chair

Professor, Gervitz Graduate School of Education
University of California, Santa Barbara
Santa Barbara, CA

Sally Hampton, Co-Chair

Senior Fellow
Pearson – America’s Choice
Fort Worth, TX

Catherine E. Snow, Co-Chair

Patricia Albjerg Graham Professor of Education
Graduate School of Education
Harvard University
Cambridge, MA

Paul Carney

English Instructor
Minnesota State Community and Technical College
Fergus Falls, MN

Mark W. Conley

Professor of Literacy
University of Memphis
Memphis, TN

David D. Haynes

Associate Professor of English and Director,
Creative Writing
Southern Methodist University
Dallas, TX

George Hillocks, Jr.

Emeritus Professor of English
University of Chicago
Chicago, IL

Tanya M. Hodge

English Teacher and English Department Chair
South High School
Minneapolis, MN

John McMillan

President
Inquiry By Design
Fort Worth, TX

Danielle S. McNamara

Professor of Psychology and Senior Scientist,
Learning Sciences Institute
Arizona State University
Tempe, AZ

Sandra Murphy

Professor Emerita, School of Education
University of California, Davis
Walnut Creek, CA

Maricel G. Santos

Associate Professor of English
San Francisco State University
San Francisco, CA

Howard B. Tinberg

Professor of English
Bristol Community College
Fall River, MA

TECHNICAL ADVISORY COMMITTEE

Howard T. Everson, Co-Chair

Executive Director and Professor
Center for Advanced Study in Education Graduate
School & University Center
City University of New York
New York, NY

James W. Pellegrino, Co-Chair

Liberal Arts and Sciences
Distinguished Professor
Distinguished Professor of Education
Co-Director, Learning Sciences Research Institute
University of Illinois at Chicago
Chicago, IL

Lloyd Bond

Consulting Scholar
Carnegie Foundation for the Advancement
of Teaching
Vacaville, CA

Philip Daro

Director, Strategic Education Research
Partnership – San Francisco
Senior Fellow, Mathematics
Pearson – America's Choice
Berkeley, CA

Richard P. Durán

Professor
Gevitz Graduate School of Education
University of California, Santa Barbara
Santa Barbara, CA

Edward H. Haertel

Jacks Family Professor of Education, Emeritus
Graduate School of Education
Stanford University
Stanford, CA

Joan Herman

Director
National Center for Research on Evaluation,
Standards and Student Testing
University of California, Los Angeles
Los Angeles, CA

Robert L. Linn

Distinguished Professor Emeritus of Education
University of Colorado
Ouray, CO

Catherine E. Snow

Patricia Albjerg Graham Professor
Graduate School of Education
Harvard University
Cambridge, MA

Dylan Wiliam

Emeritus Professor of Educational Assessment
Institute of Education
University of London
London, England

“Once again, NCEE has done a great service by documenting the facts and providing solutions to a major problem in American education, which everyone, including educational leaders, is sleeping through. In Massachusetts alone, students taking remedial courses at the community college level largely fail and it is at an annual cost of tens of millions of dollars and involves tens of thousands of students. NCEE points out that it is time for the education system — starting at the middle school level — to align content, raise it over time and at long last properly prepare students for the world of college and the workplace.”

DAVID P. DRISCOLL

Chair, National Assessment Governing Board
Former Massachusetts Commissioner of Education

“This is truly impressive work about what really matters. I was struck by its intelligence and clarity. Common Core implementation is a huge next step in ensuring that our nation’s students are college- and career-ready. This analysis by NCEE of community college curriculum as compared to what students are learning at the K-12 level points to some troubling gaps in our education pipeline that, if not addressed, will imperil our ability to prepare the next generation.”

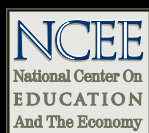
DAVID COLEMAN

President and CEO
The College Board

“With all the attention being devoted to America’s educational system — underperformance in K-12, obsolescent financial models in our state universities — we have overlooked one of the system’s most important elements: our community colleges. These institutions enroll nearly half of our college students, teach much needed skills in the trades, and prepare students for four-year degrees. The findings described in this report will surprise some readers — but deserve careful consideration by all who care about America’s ability to preserve or improve America’s standard of living.”

NORMAN AUGUSTINE

Retired Chairman and CEO
Lockheed Martin Corporation



2000 Pennsylvania Avenue, NW
Suite 5300
Washington, DC 20006

202-379-1800 | www.ncee.org

Find us on Facebook | Follow us on Twitter @CtrEdEcon