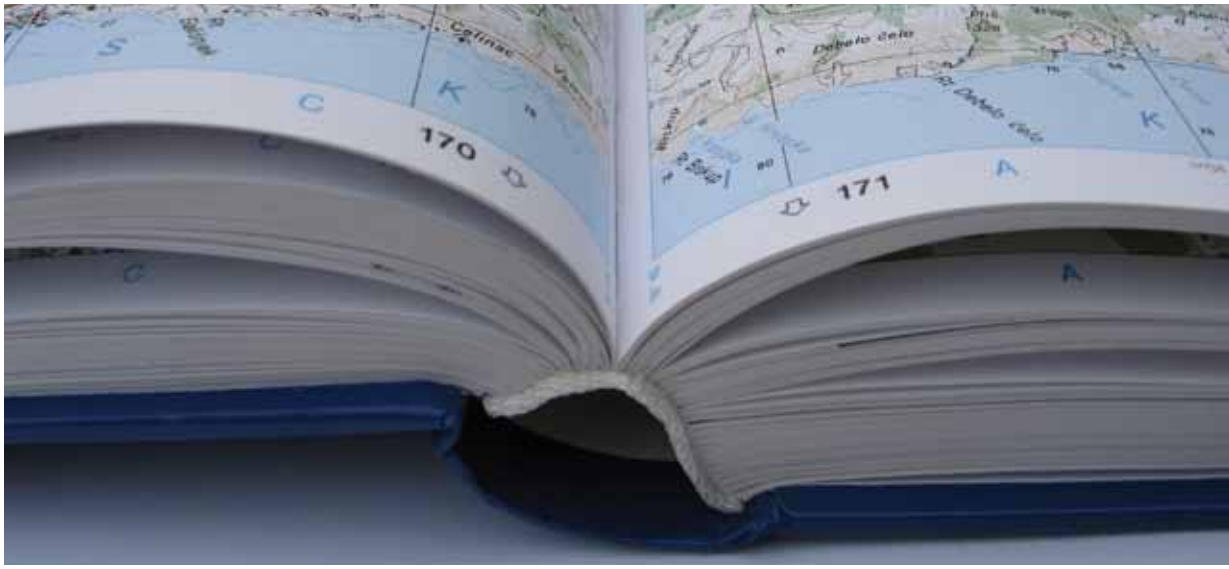
THE ROAD MAP TO

College and Career Readiness for Minnesota Students



Final Report and Recommendations Presented to
The Minnesota P-20 Partnership

Presented by
The Postsecondary and Workforce Readiness Working Group

The Minnesota P-20 Education Partnership is a voluntary organization made up of the statewide education groups in Minnesota, plus others from government, business, and other private sectors. The Minnesota P-20 Education Partnership works collaboratively to maximize achievements of all students, from preschool through elementary, secondary, and postsecondary education, while promoting the efficient use of financial and human resources. It provides a forum where critical policy issues can be collectively identified and addressed, and where data-driven decision-making structures can be developed and implemented statewide.

In 2007, the Minnesota P-20 Education Partnership charged a working group to define readiness for postsecondary education and the workforce. This is the final report and recommendations of that working group, presented to the Minnesota P-20 Education Partnership in June 2009.

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Executive Summary

In 2008, The Minnesota P-20 Education Partnership presented the following charge to the Postsecondary and Workforce Readiness Working Group:

> …develop a clear and concise definition of readiness for postsecondary education and high-skill, high-wage employment in Minnesota and a plan to disseminate that definition across the state. This definition of readiness should identify the academic content knowledge and the habits of mind that students need, not only to gain admission to a postsecondary institution or to secure high-skill employment, but to succeed once they are in college or on the job. Minnesota's readiness definition should be designed to provide the state's diverse students, families, educators and communities with understandable and actionable information that can be used to guide preparation for life after high school. It should promote both individual student success and systemic change across schools, districts and the state as a whole.

Based on this charge and a year-long exploration of postsecondary and workforce readiness, the working group makes the following recommendations to the P-20 Partnership and its members:

DEFINING READINESS

1. Adopt the following broad definition of college and career readiness as proposed by Achieve, routinely reinforcing the belief that the same level of readiness is needed for students wishing to pursue virtually any postsecondary education opportunity (degree, diploma, and certificate programs offered by two-year and four-year colleges and universities):
   Postsecondary and Workforce Readiness includes the knowledge and skills that high school graduates need in order to do credit bearing coursework at a [two-or four-year] college or university and/or to embark successfully on a career-track employment position (that pays a living wage, provides benefits, and offers clear pathways for advancement through further education and training)[i].
2. Endorse *The Road Map to College and Career Readiness*, the more detailed definition of college and career readiness that includes the academic and workplace skills, personal and social skills, and college and career knowledge as outlined in the chart: "Are You Ready for College and a Career?" *(see appendix B)*.
3. Make the information contained in the chart "Are You Ready for College and a Career?" (*The Road Map*) available to students, parents, educators, employers, and other interested parties in a variety of languages, print, and on-line forms, and distribute it widely.

ENSURING PATHWAYS TO READINESS

4. Develop and invest in opportunities for educators and faculty across all levels, P-20, to collaborate in developing strategies to implement *The Road Map to College and Career Readiness*, helping students achieve the college and career readiness standards articulated in the "Are You Ready…?" chart and related documents.
5. Charge a subsequent working group to identify, collect, and disseminate student work samples that provide clear, useful examples of college and career readiness consistent with *The Road Map to College and Career Readiness*. This work would be an excellent opportunity to facilitate increased collaboration between secondary and postsecondary educators.
6. Fund small-scale and locally-developed pilot projects or replication initiatives to identify and implement best practices for getting students back on the pathway to college and career success. We strongly recommend that these pilot initiatives must reflect collaboration between P-12 and postsecondary educators at the local level and must include, or be connected to, a process for disseminating information about "what works" in order to foster implementation of best practices that emerge from the pilot or replication initiatives.
7. Redesign P-12 curriculum for ALL students to be rigorous and relevant to a postsecondary and workforce benchmark level.
8. To ensure all Minnesota students are on the pathway to success we recommend endorsing the following:
   - Ensure that all Minnesota students develop a college and career attainment plan in consultation with a mentor, counselor, or adviser to guide course taking and planning throughout high school. This plan should begin no later than ninth grade and preferably much earlier.
   - Provide a diversity of pathway options for students to get a jump start on postsecondary study and workforce preparation (e.g., tech prep, postsecondary enrollment options).
   - Set and clearly define high expectations for all students, especially low-income and first-generation college students, as well as Minnesota's increasingly diverse student population.

- Ensure that every student knows what it means to be ready for postsecondary success and is given multiple opportunities to be college and career ready.
- Ensure that rigorous curriculum for all students is accompanied by tailored high school academic support programs and bridge programs between high school and college.
- Support and expand existing college and career ready informational resources for parents, students, schools, etc.
- Provide all students and their families with the financial information and related counseling they need to ensure that postsecondary training and education is within their reach.
- Recognize that pathways outside of course taking can be a legitimate part of a student's pathway to college and career success.

MEASURING READINESS

9. *In the short term*, encourage and fund the use of college and career readiness assessment tools currently available in Minnesota, including the assessments in the Educational Planning and Assessment System (EXPLORE, PLAN, and ACT); Accuplacer; and eventually the Minnesota Comprehensive Assessments (once revised to reflect postsecondary readiness).

10. Affirm and disseminate the non-binding college and career readiness benchmark scores derived from these assessments. *We note that this assessment information has value to students and parents only when the information is coupled with appropriate academic planning, guidance, and support.*

11. *In the long-term*, develop an interactive and searchable data warehouse so users can assess their "probability range" for college and career success based on a composite measure of data elements. This interactive warehouse would include secure access to student-specific data, a public demonstration site, and a link to user-friendly information about pathways to postsecondary readiness. Data elements would include, at a minimum, assessment scores, course-taking, and school attendance.

Finally, we want to acknowledge that the focus of this report is largely on changes that we envision happening prior to, or in some cases immediately after, students graduate from high school. In many ways, this is directly related to our charge. However, we recognize that postsecondary and community partners must do more than engage with P-12 educators and schools to help inform practices, programs, and expectations at the elementary, middle, and high school levels. Colleges and universities must also work to ensure that they provide welcoming environments for a wide array of students. Postsecondary institutions must offer instruction in ways that recognize diverse learning styles, and realize that readiness is an on-going process, not one that ends with graduation from high school. Future attention should be directed to identifying best practice models and providing incentives for pilot and replication projects within higher education consistent with the findings and recommendations contained within this report.

REPORT OVERVIEW

When he became chair of the Minnesota P-20 Education Partnership in June 2007, University of Minnesota President Robert Bruininks announced his plan to launch a series of activities designed to help the Partnership identify a limited number of actionable priorities for its work during his two-year tenure as Partnership chair. From this work, which included a survey and a series of face-to-face interviews with Partnership members, consensus emerged around four areas of focus. One of these was postsecondary and workforce readiness and a desire to build from the work of the previous college and work readiness working group to craft concise definitions of readiness, along with attention to effective strategies to measure readiness and examination of the multiple pathways students might follow to achieve readiness.

The original charge to the Postsecondary and Workforce Readiness Working Group from the Minnesota P-20 Partnership was to:

> . . .develop a clear and concise definition of readiness for postsecondary education and high-skill, high-wage employment in Minnesota and a plan to disseminate that definition across the state. This definition of readiness should identify the academic content knowledge and the habits of mind that students need not only to gain admission to a postsecondary institution or to secure high-skill employment, but to succeed once they are in college or on the job. Minnesota's readiness definition should be designed to provide the state's diverse students, families, educators and communities with understandable and actionable information that can be used to guide preparation for life after high school. It should promote both individual student success and systemic change across schools, districts and the state as a whole.

THE WORKING GROUP'S APPROACH TO THE CHARGE

The Postsecondary and Workforce Readiness Working Group first convened on March 20, 2008, and has met bi-monthly since that time (see *appendices* for a full list of working group members). In order to manage the scope of the charge and address the eight embedded guiding questions posed by the P-20 Partnership, the working group subdivided the charge into three sections and its members into three subgroups to address them. The specific guiding questions posed by the Partnership are listed below under their relevant sections or subgroups.

Defining Readiness

Related guiding questions from the P-20 Partnership:

- What are the differences, if any, between readiness for success in postsecondary education and for success in high-skill, high-wage jobs that do not require postsecondary credentials or degrees?
- What are the habits of mind and the "soft skills" required for success in postsecondary education and high-skill, high-wage employment?

Pathways to Readiness

Related guiding questions from the P-20 Partnership:

- What course-taking patterns in Minnesota junior and senior high schools are most likely to prepare students for success in various types of postsecondary education?
- What types and sequences of PSEO, Advanced Placement, IB and other dual credit courses are most likely to prepare Minnesota students for postsecondary success?
- What samples of student work in writing, mathematics and other key areas illustrate college-ready standards, and how can those samples be disseminated across the state?

Measuring Readiness

Related guiding questions from the P-20 Partnership:

- Are there threshold scores or ranges on the Minnesota Comprehensive Assessments, the ACT, Accuplacer and other relevant tests that reliably predict readiness for postsecondary education in Minnesota?
- What factors identify junior and senior high school students who are likely to take developmental courses at U of M and MnSCU institutions in Minnesota?

Making This Information Accessible

Related guiding question from the P-20 Partnership:

- How can and should Minnesota's definition of postsecondary and workforce readiness be disseminated to families, educators and communities across the state?

This preliminary report is organized around these four broad areas.

Postsecondary and Workforce Readiness includes the knowledge and skills that high school graduates need in order to do credit-bearing coursework at a [two-or four-year] college or university and/or to embark successfully on a career-track employment position (that pays a living wage, provides benefits, and offers clear pathways for advancement through further education and training).

Ready or Not: Creating a High School Diploma that Counts[iii]

DEFINING COLLEGE AND CAREER READINESS

SETTING THE STAGE

In the current environment, with its emphasis on college and career readiness for all students, it's easy to forget that such expectations are relatively new. Just a few decades ago, a majority of the population had no aspirations to attend college and, in fact, many didn't graduate from high school. Most citizens could expect to retire from the same job in which they started as young adults. A wide array of jobs primarily or entirely required only manual labor. Few outside the military used computers; spreadsheets and the Internet were unknown; and the majority of women were stay-at-home moms.

That world is long gone. The computer, the Internet, and other technological changes have transformed our lives at school, work, and home. Auto mechanics who once primarily needed to be "good with their hands" now need the skills and knowledge to repair computerized engines. Clerical staff need to be able to develop and manage spreadsheets and other data tables built using basic algebraic principles. Smart Boards are replacing chalk boards in classrooms, and an increasing number of courses are being delivered virtually to students interacting in on-line communities as well as, or in place of, face-to-face classrooms. The majority of women have joined men in the workplace, and service industries have largely replaced manufacturing as the primary source of employment in the U.S. As the economy becomes more global and the workforce more diverse, employees need to be able to work in teams with diverse co-workers rather than operating as largely interchangeable points on a production line. As knowledge grows exponentially, only those who have the skills and dispositions to be life-long learners will be able to keep up with the rapid pace of change.

MAKING THE CASE: COLLEGE AND CAREER READINESS

In the face of such sweeping changes, we are once again engaging in fundamental discussions about the purpose of high school. The history of education in America has seen a philosophical pendulum swing back and forth between defining the purpose of schools as preparing citizens to be productive workers and articulating a broader goal of preparing all individuals for higher education. In recent years, a wide array of state and national reports have gone beyond these two ideas to define college and work readiness in clear and compelling ways that not only reflect the ways in which the world has changed but make a fundamental case that college and work readiness are one and the same. Previous definitions of college readiness have now been expanded or revised beyond consideration of the academic standards that define the knowledge and skills needed to prepare students for college but also to meet current and anticipated future and workplace demands, including the personal and social readiness skills and "college knowledge" that individuals need to be successful after high school.

A changing workplace requires all individuals to have some postsecondary education when seeking employment that will provide adequate financial support. In fact, higher education is absolutely essential to the livelihood of our future workforce and the competitiveness of Minnesota businesses. Sixty-one percent of job openings in Minnesota between 2006 and 2016 will require some degree of education beyond high school. Of those occupations currently paying $15.00 or more per hour, 67 percent of projected future job openings will require higher education[ii]. High skill, high growth jobs range from innovation occupations such as scientists and engineers to jobs necessary for the management and support of business operations such as accountants and computer specialists. Skilled healthcare providers (e.g. nurses and pharmacists) will be necessary to support an aging population and education specialists (elementary teachers and postsecondary teachers) will be needed to support an increasingly diverse younger generation. Moreover, demand will not only be in positions requiring a four-year degree. High-paying occupations in manufacturing (welders and machinists), repair (automotive maintenance and equipment mechanics) and construction (electricians and plumbers) will require two-year degrees and other forms of certification. The ability of Minnesota companies to compete in a global economy will depend upon the availability of such a highly trained workforce.

In this context, it is essential that students, parents, and educators understand that a wide array of postsecondary options are available; that college and career readiness is equally important for students seeking to enter two-year colleges, four-year universities, or other postsecondary training; and that the level of preparation students need is essentially the same regardless of the type of institution attended. For too many individuals, the term "college" has been associated only with four-year programs when, in fact, a wide array of high-quality, relevant programs are available to students in two-year technical, community, and comprehensive colleges and in private proprietary schools or career colleges.

Students need the same level of skills to successfully complete general education requirements in two-year and four-year institutions. For example, although a student seeking to pursue a mathematically-intense program

will need deeper mathematical preparation than a student pursuing other programs, they all need the same skills to complete mathematics courses that are part of the Minnesota Transfer Curriculum. (see *appendices*, *Mathematical Competence Expected of All Entering College Students*) As we seek to advance a shared definition of college and work readiness, it will be as important to help the public recognize a broad definition of college and college readiness as it will be to help them recognize the connection between college and work readiness.

National and state data on developmental education further highlight the need for all students to graduate from high school academically prepared for college and to recognize the level of preparation needed to attend two-year, as well as four-year, institutions. Nationally, 50% of recent high school graduates attending college required at least one developmental course prior to enrolling in a college-level class[iv]. In Minnesota, according to the 2008 *Getting Prepared report* (prepared biannually by the Minnesota State Colleges and Universities and the University of Minnesota), 38% of 2005 Minnesota high school graduates enrolled in a public college or university within two years of graduation required at least one developmental course. Developmental courses are offered in reading, writing, math, and English for Speakers of Other Languages. Students who assess below college-level are required to complete them before enrolling in a college course. Although developmental courses are credit-bearing and eligible to be funded under financial aid, they cannot count towards a college credential.[v] As a result, too many students add to the cost and time needed to complete a college credential by having to take courses that provide skills and knowledge that might have been gained in high school.

The problem is particularly acute for those attending two-year colleges, where 48% of Minnesota students from the class of 2005 who enrolled in a public college or university within two years of graduation took one or more developmental courses. In total, of the graduating class of 2005 who enrolled in developmental courses in 2006 and 2007, 79% attended a two-year community or technical college.[vi] Unfortunately, many students assume that the open admissions mission of two-year colleges means that little or no academic preparation is needed to attend those institutions, when in fact the courses offered by these colleges require the same level of preparation as comparable courses at four-year institutions (see, for example, *appendix F,* Joint Math Statement 2005).

Finally, the need to more fully and effectively address college and career readiness is highlighted by the changing demographics in Minnesota and across the nation. The 2004 study, *Trouble on the Horizon*, is just one source of information highlighting this challenge.[vii] It notes, for example, that a dwindling supply of potential new workers will coincide with the retirement of increasing numbers of baby-boomers and, further, that "students of color and low-income students will be an increasing percentage of this pipeline, and their current achievement in high school and higher education is uneven and often inadequate."[viii] Minnesota data show this same demographic dynamic, and data analyses by ACT and others show large gaps in student test performance and graduation on the basis of race and ethnicity.

The case for change, therefore, seems clear.

DEFINING OUR AUDIENCE

While finding the information needed to define postsecondary and workforce readiness was not difficult, the group grappled with questions about who should be the primary intended audience for these new, brief definitions of readiness and how we might provide some examples to support readers' understanding of the definitions. It was also challenging to determine how to craft concise definitions of readiness that would still be meaningful and useful in helping to guide student choices and inform the thinking of educators, parents, and community, business, and policy leaders.

While the primary audience for this report is the Minnesota P-20 Education Partnership, we have proceeded with our recommendations intending that students will be the direct audience for our definitions of college and career readiness, which we recommend be called *The Road Map to College and Career Readiness* (and eventually, informally, as *The Road Map*). Parents, educators, and other adults are a secondary audience. However, recognizing it is critical to communicate fully and effectively with key adults in students' lives, we will continue to shape information and messages in a way designed to reach each stakeholder group effectively. Multiple vehicles will be needed to reach the range of stakeholders involved in the decisions students make about their future.

BASIS FOR READINESS DEFINITIONS

The definitions of college and career readiness in this report draw heavily from the work of the previous P-20 working group on college and work readiness, especially the detailed definitions of readiness in English/language arts and mathematics. The work of this group reflected the active involvement of a large number of P-12 and postsecondary educators (teachers, administrators, and staff), as well as parents, employers, and other partners with an interest in education. The definitions of readiness that emerged from this previous working group also

reflect the involvement of individuals from the working group in the Alignment Institute managed by Achieve; as such, final language defining readiness in alignment with state standards was reviewed, critiqued, and ultimately approved by Achieve and its cadre of content experts. In short, the definitional language included on our readiness chart reflects the work of a very large group of interested and invested individuals over a period of nearly four years' time.

While we recognize that other areas of college and career readiness merit attention, we have chosen to focus the academic or discipline-specific portion of our definitions of college and career readiness on English/language arts, math, and science as foundational to virtually all other learning. We do so not because we undervalue the impacts of preparation in social sciences, the arts, and world languages, but rather as a means to start with a carefully focused and limited message about college and career readiness. We trust that college and university admissions standards and career awareness tools will continue to articulate the values and purposes of preparation in a broader array of disciplines which are clearly important for citizenship and to meet other personal, professional, and societal goals.

In looking beyond subject-specific readiness, we have also made significant use of the work of David Conley, as well as an array of publications by other individuals and entities focused on improving student readiness for postsecondary education and the workforce. Conley and others have identified other personal and social readiness skills and the types of "college knowledge" associated with college and career readiness.[ix]

THE ROAD MAP TO COLLEGE AND CAREER READINESS: PROPOSED VEHICLE FOR COMMUNICATING READINESS

The table presented in *appendix B*, *The Road Map to College and Career Readiness*, illustrates how we might effectively communicate with students about why they need to be prepared for college and the workplace, what they will need to know in order to be college/career ready, and how they will know they are ready (e.g., what kinds of work products they could offer as evidence of readiness). We believe it is important to shape information that can be readily produced as both print and Web-based material. While some individuals may want a print resource, the ability to update this information and link it to additional "drill-down" resources make electronic media the preferred means of providing this information to students, parents, educators, and others.

The heart of defining readiness is providing short descriptions of what students need to know and be able to do in key disciplines and to provide brief examples of what readiness looks like in each area. *Appendix B* contains a document that summarizes the work of the previous college and work readiness working group, and in particular its two subject-specific subgroups. As such, it also reflects the more detailed work which was reviewed and endorsed by Achieve as part of the Alignment Institute in which Minnesota participated.

The table also addresses two critical areas identified by David Conley and others as being largely ignored for many students. A lack of "college knowledge": information about how to navigate within a college or university culture is described by Conley as particularly problematic for first-generation students whose parents or siblings don't have that knowledge either.[x] The list also includes many of the personal and social readiness skills identified by employers as fundamental to success in the workplace. We have also expanded on Conley's "college knowledge" work by including career knowledge descriptions and pathways.

DEFINING READINESS: RECOMMENDATIONS FOR ACTION

Based on the information presented here, we recommend that the P-20 Partnership and its members:

- Adopt the following broad definition of postsecondary and workforce readiness as proposed by Achieve, routinely reinforcing the belief that the same level of readiness is needed for students wishing to pursue virtually any postsecondary education opportunity (degree, diploma, and certificate programs offered by two-year and four-year colleges and universities):

  Postsecondary and Workforce Readiness includes the knowledge and skills that high school graduates need in order to do credit-bearing coursework at a [two- or four-year] college or university and/or to embark successfully on a career-track employment position (that pays a living wage, provides benefits, and offers clear pathways for advancement through further education and training).

- Endorse *The Road Map*, which offers a more detailed definition of college and career readiness that includes the academic and workplace skills, personal and social skills, and college and career knowledge outlined in the chart: "Are You Ready for College and a Career?"

- Make the information contained in the chart "Are You Ready for College and a Career?" available to students, parents, educators, employers, and other interested parties in a variety of languages, print and on-line forms, and distribute it widely.

As laboratories of innovation, the states must lead the charge for college-and career-readiness. Unlike years past, a student should be able to choose between an entirely academic course of study or a mix of academic, technical, online, and dual-enrollment courses and be prepared equally well for the future. State policy can set this context by ensuring high schools offer rigorous academics and several pathways for students to become college and career ready by graduation, as well as by ensuring supports are available for students as they work to meet these higher expectations.

Accelerating the Agenda: Actions to Improve America's High Schools; 2009[xiii]

PATHWAYS TO COLLEGE AND CAREER READINESS

We are proposing multiple and rigorous college preparatory pathways for Minnesota students because we agree that "a college-preparatory curriculum is the same curriculum that will prepare students for a successful working life, even if they decide not to attend college. In most circumstances, to offer students any curriculum less than this not only fails the objective of preparing a student for college, but also fails to prepare them for life and work." [xi]

First, what do we mean by rigorous? Rigor in school curricula denotes the high intellectual demand that is made on the student. **Rigorous coursework is intellectually demanding coursework that engages students in the essential core knowledge and skills of a discipline and contains appropriately sophisticated content"[xii].** It is important to note that rigorous instruction can develop students' understanding of the same subject through more than one curricular vehicle. For example, mathematical skills can be developed in an algebra II class and in an engineering design process course. In both cases, rigor is required if students are to be prepared to enter postsecondary study and workforce success without the need for remediation. Or, put another way, relevance cannot substitute for rigor.

We also urge that all rigorous curriculum be designed to hone leadership and team-work skills. Minnesota employers emphasize that employees need to be able to work on teams, collaborate, be problem solvers, be persistent, and have resilience. These personal and social skills, sometimes referred to as habits of mind or soft skills, are needed by all students to ensure that they are college and career ready, regardless of whether they plan to complete an apprenticeship after high school or attend a two-year or four-year college. These skills will allow students to be successful, regardless of the path they choose.

In addition to identifying the core readiness pathway recommendations presented below, the working group identified two guiding beliefs or key assumptions that have shaped this work.

First, Minnesota students want to go to college and they need information about pathways to college and career readiness. While many see current college participation rates or college readiness rates as indicators of youth motivation, survey data of Minnesota students' aspirations towards college attendance tells another story. For African American ninth-grade males in the survey, 82% answered affirmatively that they would like to attend college one day. For Latino young men in the same grade, 75% answered that they would like to attend college one day.[xiv] Anecdotal information tells us that, as early as the fourth grade, students inquire about the cost of attendance and the steps to get through elementary school, high school, and college.

Compelling evidence suggests that motivation to attend college exists among youth, and addressing i nformation about college early must be a critical component in order to build a strong, accessible pathway to college in Minnesota.

Second, barriers to postsecondary success are not insurmountable.
There will always be students who are moving on and off the path to postsecondary success. Some will stray further off road than others, but they will all stay on the map if we keep them in our sights. Our collective responsibility as partners committed to P-20 education is to provide many pathways for students to find the on-ramp to educational success. The following potential barriers to success for students were identified by the working group:

- Dropping out of high school
- High mobility
- Inconsistent attendance
- Working below grade level
- The limited rigor or relevance of the high school experience
- Inadequate formal guidance (school)
- Inadequate informal guidance (family, community)
- Limited exposure to technology and career information
- Financial limitations (perceived and actual)
- Inadequate student support services
- Poor transition points from elementary to middle, middle to high school, high school to post-secondary, and two-year postsecondary to four-year postsecondary

Although multiple barriers to postsecondary success exist, the working group believes that a variety of research-based strategies and successful programs can be implemented to address the barriers that undermine a student's aspirations and ability to succeed. Schools all over Minnesota and the nation are employing and monitoring effective breakthrough strategies that will help students stay on, or return to, their personal path to educational success. Where successful strategies or programs are known to exist, we recommend creating incentives to replicate these efforts. Some examples of these successful strategies are identified in *appendix C*.

Section Three

PATHWAYS TO READINESS: RECOMMENDATIONS FOR ACTION

As we explore appropriate pathways to readiness for students, we recommend that the P-20 Partnership and its members endorse the following:

- **Ensure that all Minnesota students develop a postsecondary attainment plan** in consultation with a mentor, counselor, or adviser to guide course taking and planning throughout high school. This plan should begin no later than ninth grade and preferably much earlier.

- **Provide a diversity of pathway options for students to get a jump start on postsecondary study and workforce preparation.** The Minnesota Department of Education has listed five different pathways through which students may gain college credit while in high school: advanced placement, international baccalaureate, career and technical education, CLEP, and postsecondary enrollment options, including concurrent enrollment.[xv] This communicates to students that there are many pathways to postsecondary preparation and that regardless of interest or learning style, a student should be thinking of educational opportunities beyond high school as important to their future success.

  These options are applicable to students who plan to attend a two-or four-year college or university, as well as those who plan to enter an apprenticeship or other workforce training.

  Minnesota has no agreed-upon sequence for student participation in these programs. In fact, many schools find it beneficial to their students to offer several of these options concurrently.

  Many jump-start or dual-credit-like options are available throughout Minnesota, including PSEO (on-campus and concurrent enrollment or College in the Schools), Advanced Placement, International Baccalaureate, and College Level Examination Placement exams. However, not every school is offering such options, preparing all students to be ready to take them, and/or offering them to all students. We recommend creating incentives for all schools to get all students ready and to provide all students with access to jump-start options. Specifically, we recommend that every school provide at least one such option appropriate for every student in every school and that schools develop programs to help students who lack the prerequisite skills to pursue those learning opportunities. In short, every high school student in Minnesota should be provided with opportunities to pursue the pathway to college and career readiness, and those who may lack sufficient preparation to pursue them should be provided with opportunities to attain the skills and knowledge needed to either ultimately pursue these rigorous high school options or be fully prepared to start college after graduation without the need for costly remediation.

- **Set high expectations for all students, especially low-income and first-generation college students, as well as the increasingly diverse student population in Minnesota.** This recommendation is critical for individual students' welfare. A rigorous high school curriculum, high expectations for all students, and skill development support systems provide the best means to ensure college and career readiness. A rigorous curriculum is a better predictor of college success, for example, than the ACT or SAT (see recommended long-term strategy for measuring readiness in Section Four of this report). This is particularly true for students who traditionally have not had access to college—that is, low-income students, first-generation college students, and underrepresented students of color.[xvi]

  The Carl D. Perkins Career and Technical Education Act (Perkins IV) seeks to ensure that career and technical education sets high expectations for all students. The recently reauthorized federal legislation requires states to set the same high expectations for career and technical education students that are expected of other students.[xvii] In Minnesota, this requirement is met by setting local targets under which schools must show that their students, including each sub-population of students based on gender and ethnicity, score on state reading and mathematics tests at the same or higher rates as all students in their school.

  Additionally, each recipient of federal career and technical education funds must show alignment of high school career and technical education curricula with corresponding coursework in the regional community or technical colleges. Schools and colleges are developing programs of study which identify a non-duplicative sequence of academic and technical courses leading to preparation for high skill, high wage or high demand occupations. The programs of study set high expectations for all students and include supports throughout so that students can meet the rigorous demands of the curriculum.

  NOTE: Effectively setting high expectations for all students requires schools to establish a career-and college-going culture. At the institutional level we must demonstrate the belief and expectation that all students are capable of enrolling and succeeding in postsecondary education and/or capable of and prepared for joining the workforce at a living-wage level. This should include setting specific and measurable statewide readiness goals.

- **Redesign P-12 curriculum for ALL students to be rigorous and relevant to a postsecondary and workforce benchmark level.** The level of courses that students take in high school is one of the best predictors of their success in college and the workplace. This is especially true in mathematics, with data showing a strong correlation between taking higher-level math courses in high school and achieving success in college and employment in high-growth, high-performance jobs. The number of courses students are required to take is also a key factor in setting students on a pathway to college and work readiness.

  Perhaps more important, however, is a curriculum based on K-12 standards that are aligned with the expectations of college and the workplace. College-and career-readiness standards provide the foundation to improve curriculum, instruction, and assessment so that students will be better prepared for postsecondary education and the workforce. Twenty-three states, including Minnesota, have adopted college-and career-ready standards.[xviii] A summary of rigorous course-taking patterns is included in *appendix D*.

- **Ensure that every student knows what it means to be "ready" and is given multiple opportunities to be college and career ready.** Minnesota's goal should be to eliminate the wistful or angry cries from students, "If only I had known!" Students everywhere have made the assumption that graduating from high school is synonymous with being college and career ready. We should give students the tools to confidently know if they are (or are not) college or career ready. And, if they are not, students should be given information that helps them identify areas in which they are not yet prepared.

  Academic opportunities must give students access to higher-level knowledge and skills during the course of their educational careers. The school should have in place strategies and structures for students who are struggling academically, especially in reading, math, and writing, and acceleration for those students excelling in those areas.

  Also, students need explicit information about how to prepare for success in college and in the workplace. Monitoring systems that use multiple data indicators can be used to assess a student's readiness (section four of this report outlines a long-term proposal for a statewide searchable monitoring system). If a student is not college and career ready, schools should provide effective support and interventions to match student needs. Examples of targeted and intensive programs include Advancement via Individual Determination (AVID), tutoring, mentoring, and enrolling students in double blocks of language arts and/or math.

  Just two examples of schools providing multiple pathways and support systems are St. Louis Park High School and St. Paul Johnson High School. St. Louis Park High School has a successful targeted ninth-grade program. Other Minnesota schools with ninth-grade academies include Owatonna, Denfield in Duluth and Marshall. Johnson High School offers eight academies: small learning communities that set high standards for all students, build relationships between students and adults, and connect high school to the future. Students develop a personal plan of study determined by an analysis of interests, skills, strengths, and talents.

- **Ensure that a rigorous curriculum for all students is accompanied by high school academic support programs and bridge programs between high school and college.** High schools should have in place strategies and structures for students who are struggling academically, especially in reading, math and writing. Some recommended strategies and structures include: curricular scaffolding, support for ELL students, academic intervention programs such as AVID, and bridge programs between high school and college.

  o **Scaffolded curriculum**. Instructional materials and strategies must incorporate effective scaffolding – materials and instruction that start where the student is, develop concepts and skills very explicitly, and help students gain the skills and knowledge needed to move on to the next step in the curriculum.

  o **Support for ELL students**. Immigrant students or children of immigrants face additional burdens by virtue of having to learn another language. Support for these students is essential. Schools must develop practices that give immigrant students and their families key information about education and workforce opportunities, successfully address cultural issues, and help students understand financial aid processes.

  o **Academic intervention programs**. For students who are struggling academically, who are potentially first-generation college students, or who come from low economic backgrounds, schools should provide effective academic support and interventions. Examples of targeted and intensive programs include Advancement via Individual Determination (AVID), tutoring, mentoring, Ready or Not Writing, and enrolling students in double blocks of language arts and/or math.

  o **Bridge programs**. A bridge program assists students in transitioning successfully from high school to college. These programs are particularly beneficial for first-generation college students. Typically students are provided with additional information about a college campus and enrollment procedures prior to their first semester. Students are also offered academic support and social activities to assist them with a

positive adjustment to campus life. Programs may vary in terms of duration and scope. For example, **St. Olaf** offers a five-week, free, credit-bearing summer session; the **University of Minnesota** provides targeted summer programming for incoming technology and computer science students; and through "Fast Track," **Minnesota West Community and Technical College** works with local high schools to provide mentoring, math, reading, and time management skills.

- **Support and expand existing college and career ready informational resources for parents, students, schools, etc.** Minnesota has one of the lowest counselor-to-student ratios in the United States. Most counselors do not have time to meet with students regarding their career plans or areas of postsecondary study needed to reach their career goals. Some schools are successfully partnering to make career and college information available in public libraries and community centers so that resources are available for students and their parents beyond the school day. These innovations should be supported, as should additional strategies for informing parents and students about college and career opportunities and the availability of financial aid.

  Colleges and universities can also work with schools to provide more college and career information. For example, studies have shown that the most important contact for a first-generation college student is someone from a two-or four-year institution coming to their high school and speaking about going to college. College students working on service learning projects, college admission counselors, and career counselors from colleges and universities have an important role to play.

- **Provide all students and their families with the financial information they need to ensure that postsecondary training and education is within their reach.** Students and families can experience a great deal of anxiety when exploring postsecondary education opportunities. There are many factors that prevent low-income and/or first-generation college students from navigating the financial aid process. Some of these include parent and student misperceptions of affordability, lack of knowledge about financial aid, and challenges navigating the complexities of the financial aid system.

  > Planning for college must begin early to raise student and family awareness, expectations and aspirations for college. Low-income and first-generation families have access to fewer college admissions and financial aid resources and are less likely to fulfill their postsecondary plans as a result. Most low-income students, understandably, have done very little financial planning for college.[xix]

  Providing more information about the availability of financial aid and the financial aid process as a whole is critical, especially for low-income students, in order to impact college-going rates. An updated analysis by the American Council on Education (ACE) finds that, "an estimated 1.5 million students who were likely eligible to receive Pell Grants in the 2003-04 academic year missed out on the assistance because they did not apply for financial aid."[xx]

  Limitations to financial aid information or access results in fewer students attending institutions than are qualified to attend. "Every year, 410,000 college-qualified students from households with income of less than $50,000 enroll in community colleges instead of going to a 4-year college. Another 168,000 college-qualified students don't enroll in college at all."[xxi]

- **Recognize that pathways outside of course taking can be a legitimate part of a student's pathway to college and career success.** Students' involvement in school, community, church, and other activities can be an important pathway to building the skills, knowledge, habits, and confidence to become college and career ready. Both admissions offices and employers like to see that students have applied their learning outside the classroom and developed leadership and collaboration skills beyond the classroom. Students have a wide range of out-of-school-time activities and organizations from which to choose; a short list of examples include student organizations, 4H, First Robotics, debate clubs, church-related organizations and activities, and career and technical student organizations. Many of these activities and organizations provide local, regional, state, and national opportunities for students to demonstrate their knowledge and skills.

  We also highly recommend internships and service learning opportunities for all students, especially for students who are on a career and technical path. Internships and service learning provide students with invaluable career advice and build the leadership and team work skills that are key to success.

MEASURING COLLEGE AND CAREER READINESS

In addressing the P-20 Partnership's guiding questions related to measuring readiness, the working group recommends a broad-based Readiness Assessment Plan. This Assessment Plan should be designed to identify, calculate, and display academic performance indicators and assessment information in a manner that is readily useable and helpful to students and their families. This information must also be linked back to user-friendly information about pathways to readiness. All students, regardless of where they are on the continuum of readiness, and despite potential barriers and setbacks, should be able to chart a potential path to college and career readiness.

Realizing that an ideal Readiness Assessment Plan that incorporates all the elements recommended by the work group is a significant undertaking, we suggest both a short-term proposed strategy and a longer-term strategy.

We recognize and stress that a focus on academic performance indicators and assessment data in these recommendations is intended to be *in addition to, not in lieu of,* a focus on the personal and social skills and college and career knowledge that are fundamental to college and career readiness (outlined in earlier sections of this report).

> An effective statewide support system can improve student performance by tailoring interventions to students' needs. **The first step is to gather data that help educators identify academic trends and enable policymakers to target resources more efficiently**. Such data not only should describe the academic proficiency of students, but also [shed light on] high school outcomes … based on prior academic performance as well as attendance and effort rates. "Early warning" data systems collect leading indicators of student dropout rates. Sharing this information allows middle and high school educators to more accurately target academic supports, structural interventions, and funding decisions.[xxii]
>
> *Accelerating the Agenda: Actions to Improve America's High Schools; 2009*

MEASURING ACADEMIC READINESS: SHORT-TERM RECOMMENDATIONS FOR ACTION

- Encourage and fund the use of college and career readiness assessment tools currently available in Minnesota, including the assessments in the Educational Planning and Assessment System (EPAS), Accuplacer, and eventually the Minnesota Comprehensive Assessments (once revised to reflect postsecondary readiness).

- Affirm and disseminate the non-binding college and career readiness benchmark scores derived from these assessments (see *appendix E* for an example of benchmark scores). Note that while this benchmark score information is provided here, the working group is reluctant to place too much emphasis on benchmark scores before Minnesota stakeholders are able to develop the more complete Readiness Assessment Plan we've outlined in the long-term recommendations presented below).

EXPLORE-PLAN-ACT (Educational Planning and Assessment System, or EPAS)
EPAS is a set of assessments that provides a longitudinal, systematic approach to educational and career planning, assessment, instructional support, and evaluation. The system focuses on the integrated, higher-order thinking skills students develop in grades K-12 that are important for success both during and after high school. These assessments were developed to benchmark college readiness for students across the country. They are the first and best indicator currently available of Minnesota students' college readiness. The EXPLORE and PLAN assessments are given in grades eight and 10 respectively, and they are currently funded by the State of Minnesota for most students in the public K-12 system. The ACT is the final assessment of this college readiness system.

ACCUPLACER Accuplacer is a series of computer-adaptive, postsecondary placement exams that provide information about students' academic skills in math, English, and reading. The results of the assessment, in conjunction with a student's academic background, goals, and interests, can be used by academic advisors and counselors to determine course selection. The work group recommends use of the Accuplacer for students who do not meet the readiness benchmarks on PLAN or ACT in a subject area(s). The results can provide additional and specific information about the knowledge and skills that require remediation for students to be college and career ready upon graduation from high school. We emphasize that using the Accuplacer in this way only has relevance if results inform a concrete, coherent, and individualized strategy to address students' deficiencies and get them back on the path to postsecondary readiness.

Minnesota Comprehensive Assessments (MCAs)
These assessments and the standards to which they are aligned are not currently designed to determine college or career readiness as presently defined. Their redesign will incorporate this purpose as the Minnesota Academic Standards are revised to reflect college and work readiness. However, the MCAs are the only assessments recommended in this short-term strategy that are currently required of all students under state and federal statute. The scores from these assessments can be compared against those of the EPAS to provide additional guidance about student readiness.

Advantages of this approach:

- Interpretive information is readily available and understood by the general public.
- Information provides helpful, if general, guidelines for student planning.
- The Minnesota legislature currently funds most students' participation in the EXPLORE and PLAN portions of the Educational Planning and Assessment System (EPAS). If all Minnesota students in grades 8 and 10 participated, however, current levels of funding would not be sufficient.
- Data are accessible.
- The Minnesota State Colleges and Universities system has set system-wide benchmarks for expectations on Accuplacer.
- Data for EPAS can be included in MDE's Educator Portal to make MCA and EPAS data available for districts and schools.

Issues to be addressed:

- Not all students currently take the EPAS assessments.
- Accuplacer is not currently available to all students.
- Additional infrastructure must be in place to include EPAS (and/or Accuplacer) data within MDE's Educator Portal.
- Minnesota Academic Standards are on a scheduled revision cycle. Consequently, information that predicts students' postsecondary success becomes outdated as the tests are revised and must be regenerated.
- Identifying a single benchmark target (or even a benchmark range) for these assessments can be misleading because the score range is very narrow and the differences between scores can appear disproportionately large. Further, different postsecondary institutions (and even programs within institutions) set different ACT benchmarks for admission.
- Assessment data alone do not yield as much accurate predictive information as a composite of assessment data, student high school attendance, and student course taking (all of which are components of the proposed long-term strategy).

MEASURING ACADEMIC READINESS: LONG-TERM RECOMMENDATIONS FOR ACTION

Develop an interactive and searchable data warehouse so users can assess their "probability range" for college and career success based on a composite of predictive data elements. This interactive warehouse would have three components:

- a private, secure access where the student could review his/her data in relation to the readiness benchmark targets as he/she progresses through the K-12 system
- a public demonstration site where a student or parent could enter hypothetical data to predict readiness (e.g., similar to a public Web site that promotes wellness where the user enters height, weight, cholesterol levels, etc. and the results provide general directives to improve one's health such as realage.com)
- a link back to user-friendly information about pathways to postsecondary readiness. All students, regardless of where they are on the continuum of readiness, and despite potential barriers and setbacks, should be able to chart a potential path to postsecondary success.

The data elements of this interactive warehouse would include but not be limited to the following:

- EPAS scores (as available depending on grade of student and assessment[s] completed)
- MCA scores (as revised to reflect college and career ready standards)
- Course taking (courses completed with a grade of "B" or better) science, math, English/language arts
- Attendance
- Additional data elements as research and capacity allow

Advantages to this approach:

- Provides more robust and reliable planning information to students than does the short-term goal
- Could be added to GPS LifePlan, Ramp-Up to Readiness strategies, or other college and career planning tools, which are potentially available to all Minnesota students
- Provides students and parents the ability to track actual performance on these indicators (secure site) plus the ability to discuss "what if" scenarios on the public site (e.g., "What if you improved your attendance? What if you decide to take that more rigorous course next year?")

Issues to be addressed:

- Those listed under the short-term strategy
- Not all necessary information is currently/readily available (e.g., students' course grades are not currently being systematically tracked across the state).
- Course content is not consistent across the state, so there could be substantial variability in the meaning behind a course grade achieved. MDE is beginning work on a course catalog where course names have common standards, modeled after that of the National Center for Education Statistics (in which high school biology is scheduled for implementation in 2009).
- There is always the risk of scores being used in pernicious ways to rate the quality of schools or whole systems rather than for the intended use of helping students plan and prepare.

MAKING COLLEGE AND CAREER READINESS INFORMATION ACCESSIBLE
TO MINNESOTA STUDENTS, FAMILIES, EDUCATORS, AND CONCERNED STAKEHOLDERS

A key guiding question presented to this working group was:

> How can and should Minnesota's definition of postsecondary and workforce readiness be disseminated to families, educators and communities across the state?

The working group considered this question from the perspective of multiple audiences and we make a number of specific recommendations.

SYSTEMS AND COMMUNITY LEADERS AS THE AUDIENCE

- P-20 Partnership members play a crucial leadership role in ensuring that an aligned, useful, and comprehensive message about postsecondary and workforce readiness is shared with stakeholders across Minnesota. They can ensure that the adopted recommendations (including definitions of readiness, guiding principles to ensure a pathway to readiness, and strategies for measuring readiness) are known and understood at all levels within their respective organizations. In endorsing and communicating a common message, the P-20 Partnership will model the kind of cross-sector, inter-organizational commitment that will be needed to ensure the success of all students.
- In the process of seeking review and comment on earlier drafts of this report, several reviewers reminded us that postsecondary and community partners must do more than engage with P-12 educators and schools to help inform practices, programs, and expectations at the elementary, middle, and high school levels. For example, colleges and universities must work to ensure that they provide welcoming environments for a wide array of students, offer instruction in ways that recognize diverse learning styles, and recognize readiness as an on-going process, not one that ends with graduation from high school. Future attention should be directed to identifying best practice models and providing incentives for pilot and replication projects.

STUDENTS AND FAMILIES AS THE AUDIENCE

- Present information about readiness in a streamlined fashion that aligns definitions of readiness with information about pathways and provides clear explanations of assessment tools. This reference guide should also include relevant student work samples. (We recommend these be developed by a future working group of secondary-postsecondary educators.) There are excellent formatting models for this type of effort (e.g., California State University has designed a series of "How to Get to College" posters and on-line resources that have information for students and families).
- Make this aligned reference guide available in print and on K-12 and higher education Web sites (including Minnesota Department of Education, Minnesota State Colleges and Universities, University of Minnesota, Minnesota Office of Higher Education, and Minnesota Private College Council), at public high schools across the state, and via nonprofit organizations serving students (e.g., organizations served through the Minnesota College Access Network, such as Admission Possible).
- Roll-out key elements of this aligned reference guide in 2009 through a major, joint effort designed to get maximum visibility prior the start of the 2009-10 school year (possibly at the State Fair).
- Ensure that all documents intended for students and families are translated into (at a minimum) Hmong, Somali, and Spanish.
- Present key messages about postsecondary and workforce readiness to stakeholders throughout Minnesota through community forums similar to the STEM workshops sponsored by MDE in 2007-2008.

Section Five

EDUCATORS AS THE AUDIENCE

- Ensure that key messages about college and career readiness (including a P-20 endorsed definition of readiness and a common framework for assessing readiness) are included in back-to-school workshops for superintendents, principals, teachers, and high school counselors.

- Work with professional associations (e.g., Minnesota Association of School Administrators, Minnesota Secondary School Principals Association, Minnesota School Counselors Association, Education Minnesota, Minnesota Association of Charter Schools, Minnesota Association of Alternative Programs, Minnesota Minority Education Partnership) to disseminate this information through their communication networks.

- Seek multiple opportunities for educators to work across our secondary and postsecondary educational systems, public and private, to help ensure the fulfillment of the recommendations proposed in the Pathways section of this report.

We anticipate that two specific working group recommendations, in particular, may serve a dual purpose of enriching our understanding of successful pathways to readiness and also increasing a shared awareness among educators at the K-12 and postsecondary level:

- Charge a subsequent working group to identify, collect, and disseminate student work samples that provide clear, useful examples of college and career readiness. This work would be an excellent opportunity to facilitate increased collaboration between secondary and postsecondary educators.

- Fund small-scale and locally-developed pilot projects or replication initiatives to identify and implement best practices for getting students back on the pathway to postsecondary success. We strongly recommend that these pilot initiatives must reflect collaboration between K-12 and postsecondary educators at the local level.

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Appendices B

THE ROAD MAP TO COLLEGE AND CAREER READINESS: ARE YOU READY FOR COLLEGE AND A CAREER?

Why Do You Need to be Ready for College and a Career?

- Higher education is essential to the livelihood of our future workforce and the competitiveness of Minnesota business.
- 61% of job openings in Minnesota between 2006 and 2016 will require some degree of education beyond high school.
- Of those occupations currently paying $15.00 or more per hour, 67% of projected future job openings will require higher education.
- Being college and career ready requires having the reading, writing, math, and science skills needed to begin college-level work without having to take remedial classes in college that cost time and money and do not grant college-level credit.
- Preparing for college and work also means more than taking the right courses in middle and high school – it also means building and demonstrating an array of skills and behaviors that will show your professors and employers that you have what it takes to be successful on campus and on the job.
- The ability of Minnesota companies to compete in a global economy will depend upon the availability of such a highly trained workforce.

MN Dept. of Employment and Economic, *Development 2006-16 Employment Projections and Occupational Employment Statistics*

(note that in a web-based format, many of the items on this chart would be linked to additional "drill down" information and resources, including specific work samples and additional pathways information)

MATHEMATICS

Colleges expect high school graduates to be prepared for college-level math. All students enrolled in two-and four-year colleges, regardless of their field of study, will take courses that require mathematics competence. In addition, students must understand and be able to apply mathematics in a variety of courses, such as economics, biology, or automotive technology. Math teaches us to think and solve problems.

What does "ready" mean?	Examples of College Ready	Examples of Career Ready	Examples of Pathways to Readiness
Mathematical competence consists of understanding, proficiency, and skill in complex problem solving within: Algebra-Variables, equations, functions and graphs Geometry-axioms, deduction, geometric reasoning, trigonometry and visualization Data Analysis-representations of data, probability and statistics. To achieve competency in these core content areas, students need to employ mathematical reasoning. In particular, students will need to: • Understand the logical structure of mathematics and apply formulas to solve problems • Recognize the role of definitions, proofs, theorems and counter-examples • Use both inductive and deductive reasoning to arrive at valid conclusions • Distinguish relevant from irrelevant information • Employ and understand symbols of mathematics precisely	**Arithmetic** Solve two-or three-step problems involving ratio proportion: percentage of or added on, fractions. Apply rules of exponents. Apply properties involving positive and negative numbers. Prime factorization. **Algebra** Evaluate algebraic expressions by substituting integers for unknown quantities. Solve and graph quadratic equations. Solve absolute value equations. Solve linear inequalities that require reversing the inequality sign. Factor quadratic equations. **Statistics and Probability** Exhibit knowledge of joint and conditional probability. Compute probability when event and/or sample space is not given. **Geometry** Pythagorean Theorem. Apply properties of similar and congruent triangles. Evaluate composite functions of inter values. Express sine, cosine and tangent of a right triangle.	Nursing -calculate dosages of medication Construction -determine pitch of a roof Using sound reasoning and analytical thinking to solve problems Managers-creating a budget of expenses Interpretation of trends and data Analyzing profit and loss statements Estimating a quote for payment for services rendered Calibrating sprayers for application of agricultural chemicals Statistical regression models in accounting Interpolation of pipe sizes for appropriate drainage where codes do not specify accurately Calculation of paper purchases based on weight and waste allowance attributable to standard paper sizes	NOTE: Achieving the math competence needed for college-level work requires enrolling in a mathematically intensive course every semester of high school including senior year. Standards-based high school math courses, such as algebra, geometry, trigonometry, precalculus, and calculus Other rigorous courses, such as: • Project Lead the Way • Advanced placement • International Baccalaureate • PSEO/Concurrent Enrollment • Tech Prep • Medical Academies Assessments of skills and knowledge/readiness, such as: • CLEP examination • PSAT/ SAT • EXPLORE, PLAN, and ACT • Accuplacer exam • CLEP exams

ENGLISH/ LANGUAGE ARTS

Nothing is more fundamental to one's ability to succeed as a student, employee, and citizen than the ability to read and communicate effectively. These skills are necessary in every subject area, career, and virtually every interaction with others. Skills first developed in kindergarten, or earlier, need continuing development throughout one's educational career and beyond.

What does "ready" mean?	Examples of College Ready	Examples of Career Ready	Examples of Pathways to Readiness
Reading competence consists of proficiency and skill in reading and comprehension of a variety of sources, including: • College textbooks • Novels • Plays • primary sources • technical manuals • other related work and college documents To achieve competency in these core content areas, students need to employ reading strategies. In particular, students will need to: • Locate, analyze and judge the quality of information from a variety of sources • Demonstrate reading comprehension from a variety of sources and formats • Apply knowledge of vocabulary and terminology Competence in writing consists of proficiency in communication that incorporates correct grammar, spelling, and punctuation and the ability to develop clear, logical, and persuasive documents that are tailored to the audiences for which they are intended.	**Acquire Information** **Reading**-use vocabulary skills, analyze informational and literacy text and arguments **Listening**-follow directions, identify main idea and supporting details, summarize, paraphrase, analyze **Viewing**-understand and evaluate media, consider visual and verbal intersections and analyze visuals, sound and design **Communicate Information** **Writing**-topic development and focus: vocabulary, syntax, style, tone, and grammar; organization and transitions; writing process that includes planning, editing, revising and using technology **Speaking**-develop ideas; organize ideas clearly and logically making smooth transitions; coherence and cohesion, use a range of speaking strategies, and facility, including gestures, speaking rates, volume and pitch and using eye contact **Producing Digital Media**-clear messages appropriate to audience and purpose; apply the writing skills identified above and use varied visual images, text, graphics and sound effects	Draft a work memo, research paper, technical report, proposal, business plan, resume, and cover letter Research innovations in your field Develop promotional materials Creative thinking and problem solving Read technical information and follow technical procedures Develop procedural checklists for efficient task accomplishment Formulate specifications and justifications Compose a written analysis of statistical data	Standards-based high school courses, such as composition, literature, and speech. Other rigorous courses, such as: • Advanced placement • International Baccalaureate • PSEO/Concurrent enrollment • Business writing and business law courses • Courses requiring interpretation and utilization of technical manuals Assessment of readiness, such as: • Ready or Not Writing • PSAT/ SAT • EXPLORE, PLAN, and ACT • Accuplacer exam • CLEP exams

SCIENCE

Changes in the workplace require that all students graduate from high school ready to pursue a science or technology-based career, even if they are not so inclined while in high school. In an increasingly technological society, strong science skills and knowledge are also important for civic responsibility.

What does "ready" mean?	Examples of College Ready	Examples of Career Ready	Examples of Pathways to Readiness
College and career readiness in science requires that students use scientific principles and processes to make personal decisions and to participate in discussions of scientific issues that affect society (NRC). This requires that students: • Understand and use scientific inquiry and investigation • Understand and apply principles of engineering design • Understand connections between and among science disciplines, and between science and technology, engineering, and mathematics • Understand interactions among science, technology, engineering, mathematics and society • Understand how to apply critical thinking, problem solving, quantitative reasoning, and observation skills to technical content • Understand the distinctions between science and technology • Understand what a theory is and appreciate its complexities • Know the "big ideas" of physical science (e.g., mass, charge, and motion) • Know the "big ideas" of life science (e.g., evolution, cells, and reproduction) • Know the "big ideas" of earth and space science (e.g., atmosphere, circulation patterns, and energy conversions)			Standards-based high school courses, such as chemistry, biology, and physics Rigorous courses, such as: • Advanced placement International Baccalaureate • PSEO /Concurrent enrollment • Electronics courses Rigorous programs, such as: • Medical career academies • Agricultural science • Application of optics Assessment s of skills and knowledge/readiness, such as: • PSAT/ SAT • EXPLORE, PLAN, and ACT • Accuplacer exam

PERSONAL AND SOCIAL SKILLS

Being ready for college and work requires more than the skills and knowledge developed in academic courses. Employer, educators, and many others agree that you need an array of personal and social skills in order to be successful in virtually any career.

What does "ready" mean?	Examples of College Ready	Examples of Career Ready	Examples of Pathways to Readiness
Strong personal skills and attributes support success in both college and careers. In particular, students will need to: • Manage their time effectively • Use modern technology • Be an effective team member • Develop self awareness	Persistence Seek out resources Take detailed notes Organize course materials Use modern technology (email and Internet) Work as an effective team member Value the opinions of individuals with varied backgrounds and perspectives Develop self-awareness through understanding one's strengths and weaknesses Seek and accept critical feedback	**Resources**-allocate time, money, materials, space, staff **Interpersonal skills**-work on teams, teach others, serve customers, negotiate with and lead people from culturally diverse backgrounds **Systems**-understand systems, monitor and correct performance, distinguish trends **Information**-acquire and evaluate data, organize and maintain files, use computers to access information **Personal qualities**-individual responsibility, self-esteem, sociability, self-management and integrity	Participate in group projects Use of college and career resources (MCIS, ISEEK, GPS Lifeplan) Participation in student leadership organizations Service learning opportunities Technical clubs-HOSA, BPA, Skills USA AVID Admission Possible

COLLEGE AND CAREER KNOWLEDGE

Being ready for college requires more than having the skills and knowledge needed to complete college courses and be successful in a career. You'll also need "college knowledge" that will help you choose the college and program/major that are right for you as well as how much it will cost you to attend college and how to find any financial aid you may need.

Career knowledge includes learning about an array of careers, especially as they relate to your strengths and interests. Knowledge about careers of potential interest also help you identify which courses you need to take in high school in order to keep your options open after graduation.

What does "ready" mean?	Examples of College Ready	Examples of Career Ready	Examples of Pathways to Readiness
College Knowledge competencies include: • Recognize the return of investment of a college education • Understand how a college system operates • Identify the norms of a college culture • Understand the range of college options and the steps and general timetable for admission to each • Know how to finance a college education **Career Knowledge** • Understand current labor market trends in the industry • Knowledge about high wage, high demand careers • Knowledge of educational requirements of the career • Recognize the career pathway option and stop-in and stop-out points	**College Knowledge** • range of options and degrees • career pathway information • financial aid, scholarships, grants, work study, 529 accounts • Labor market trends regionally, statewide and nationally • Understanding educational requirements for desired position • Identifying type of institution granting credentials for career field • Curriculum sequence for the degree • Extern and internship opportunities • Modern technology	**College Knowledge** • Labor market trends regionally, statewide and nationally • Understanding educational requirements for desired position • Identifying type of institution granting credentials for career field • Range of stop-in and stop-out opportunities in the career pathway • Networking • Social networking • Interviewing • Job shadowing • Professional business etiquette and dress • Modern technology	Job shadowing Mock Interviewing 5 year plan/My Life Plan/GPS Lifeplan Internships Clinicals Efolio Portfolio Work experience or co-op College visits Worksite visits PSEO/concurrent enrollment Bridge programs Jobs for Americas Graduates Upward Bound Talent Search

WHEN BARRIERS BLOCK A PATHWAY TO SUCCESS: SUCCESSFUL STRATEGIES AND PROMISING PRACTICES

The strategies and promising practices presented here were identified by the working group as snapshots of currently known efforts to address student barriers to success. The list is not intended to be a comprehensive summary of such initiatives.

For each of the barriers to success outlined below, we have included the following information:
- Rationale for identification as a barrier to postsecondary success;
- Evidence of the barrier's impact on Minnesota students; and
- Examples of current strategies to address the barrier.

BARRIER: DROPPING OUT OF SCHOOL

Rationale for identification as a barrier: The lowest-achieving 25 percent of students are 20 times more likely to drop out of high school than students in the highest achievement quartile.[xxiii]

Evidence of the barrier's impact on Minnesota students: Minnesota 2007 NGA Rates indicate 73.1% Graduates, 6.3% Dropouts, 14.3% Continuing, and 5.4% Unknown.

Over the last five years, students of color and American Indian students were two to five times as likely to drop out of school as their white peers.

In 2005, Minnesota white students beat the overall national average of graduation rates by nearly six points; in contrast, Minnesota students of color and American Indian students average 10 to 17 points below the national average for graduation rates.[xxiv]

Examples of current strategies to address the barrier: Using a framework of 10 effective strategies and a process outlined by MDE, districts can make informed decisions about programming and approaches to ensure that students graduate with a diploma and are ready for postsecondary education and work. The model is being piloted in seven school districts: Brooklyn Center, Duluth, Hibbing, Park Rapids, Red Lake, Richfield and St. Paul. Through these pilots, effective dropout prevention strategies and approaches that meet unique community needs and strengthen the quality of school-community collaborations are being researched, identified, disseminated and implemented. Strategy areas include mentoring, after-school programming, literacy development, family engagement, safe learning environments, service learning, individualized learning, alternative schooling, professional development, and school community collaboration.

Several schools throughout Minnesota and the nation are also employing the strategies of Check & Connect, a program designed at the University of Minnesota to increase student engagement and decrease the likelihood of students dropping out of school.

BARRIER: LIMITED RIGOR OF THE HIGH SCHOOL EXPERIENCE

Rationale for identification as a barrier: There continues to be a disparity between secondary and postsecondary views of college preparedness. For example, 32% of college faculty members consider students ill-prepared for college-level mathematics compared to nine percent of high school teachers.[xxv]

In *The Silent Epidemic*, researchers who interviewed dropouts across the country report that nearly 70% said they were not motivated to work hard and two-thirds would have worked harder if more were demanded of them.[xxvi]

In 2006, the U.S. Department of Education examined its longitudinal databases to follow students who were eighth-graders in 1988, graduated from high school in 1992, and set out to earn a bachelor's degree. Their educational results were tracked using high school and college transcripts through December 2000. They found that curriculum rigor trumps just about everything else in predicting college success. Among the key findings:
- The academic intensity of high school curriculum is the most important predictor of college success.
- Of students who completed a high school curriculum at the highest levels of academic intensity (which the analysis defined as a core course including three to four years of English, math and science, and IB or Advanced Placement® courses), 95% earned a bachelor's degree.
- No non-White in America comes close to attending high schools in which a rigorous college-prep curriculum is universally available. Minority students and those from low-income families have the least access to such a curriculum.
- The combination of getting beyond algebra II in mathematics and taking three Carnegie units in laboratory sciences (biology, chemistry and physics) is a huge predictor of college success.[xxvii]

Evidence of the barrier's impact on Minnesota students: Data about the 2008 Minnesota students who took the ACT reveals that only 32% of students met all four ACT benchmark scores in english composition, algebra, social sciences, and biology.

Only 40% of Minnesota students were likely to be ready for college-level work in biology, and only 56% were likely to be ready for college-level work in algebra.[xxviii]

There are large racial disparities in the college readiness indicators among test takers as well. For example, algebra scores ranged from 59% of White students ready for college courses to 41% of Asian/Pacific Islanders, 38% of American Indian, 34% of Latino, and 16% of African American students.

Choice of courses taken in high school matters for college readiness. Test scores go up for all students when they take the minimum core high school courses recommended by ACT, which is four years of English, three years of social science, three years of math (algebra, geometry, algebra II) and three years of science (biology, chemistry and physics).[xxix]

Examples of current strategies to address the barrier: State policy now includes additional requirements for the graduating class of 2015. Students in the class of 2015 must complete an algebra I credit by the end of 8th grade and must also complete an algebra II credit or its equivalent before graduation.

In addition, students in the class of 2015 must earn a biology credit and a chemistry or physics credit as part of the 3-credit requirement in science.

BARRIER: INADEQUATE FORMAL GUIDANCE FROM SCHOOLS

Rationale for identification as a barrier: The need to increase the rigor of high school programs has been the dominant cry of the school reform movement in the last decade. Much of this effort revolves around improving college planning and counseling, raising graduation requirements, ensuring student access to high-quality courses, narrowing the achievement gap, and aligning course content with the skills required to succeed in work and higher education.[xxx]

Evidence of the barrier's impact on Minnesota students: Minnesota ranks among the states with the lowest counselor-to-student ratios in the nation, with the average Minnesota school counselor currently responsible for about 750 students. That's three times the recommended counselor-to-student ratio.[xxxi]

A survey conducted by the Minnesota School Counselors Association of 89 schools in west central Minnesota found elementary schools averaged 1,468 students for each counselor, middle schools averaged 517 students for each counselor, and the ratio fell to 430 to 1 at the high school level.

Examples of current strategies to address the barrier: Programs such as Admission Possible and federally-funded TRIO pre-college programs seek to provide additional postsecondary advising and guidance to students who have been underrepresented in postsecondary education systems. The University of Minnesota's *Ramp-Up to Readiness* initiative is piloting additional guidance and readiness strategies with schools.

BARRIER: INSUFFICIENT INFORMAL GUIDANCE FROM FAMILY

Evidence of the barrier's impact on Minnesota students: The majority of Minnesota's new foreign-born residents are quite young and have an immediate impact on K-12 schools. Of the 18,254 new immigrants who entered Minnesota in 2006, 5,656 (31% of the total) were under 18 years old, and 3,149 (17%) were between the ages of 18 and 24 years. Students in Minnesota public schools speak 97 different languages. The most predominant primary home languages spoken by Minnesota's non-native English speaking students in 2006 were Spanish (32,239 students), Hmong (22,665 students), and Somali (9,583 students).[xxxii]

Examples of current strategies to address the barrier: California State University began to work with two programs. The first was Parents Involved with Quality Education (PIQE). CSU provided $575,000 in funding in 2006 for all 23 CSU campuses to partner with local schools to bring the PIQE program to areas where they did not exist. Founded in 1987, PIQE is a nine-week training program for parents with students in grades K-12. During weekly evening classes, parents learn how to improve their child's performance in the classroom, enhance the parent-and-child relationship, and map out a strategic plan to get their children enrolled in a college or university.[xxxiii]

In Minneapolis and St. Paul, schools and communities have partnered to establish college and career centers in public libraries and community centers so that parents and students together can access information during non-school hours.

BARRIER: LIMITED EXPOSURE TO CAREERS

Evidence of the barrier's impact on Minnesota students: The Governor's Workforce Development Council received testimony from numerous education organizations and concluded that Minnesota students would benefit from more attention to college and career planning while in high school. The Council has recommended that the state consider adding a requirement that all students complete a college and career plan prior to graduation.

Examples of current strategies to address the barrier: iSeek Solutions operates under a joint powers agreement among four state agencies and two state higher education systems to provide career information to Minnesota citizens. Three career products are produced in Minnesota; iSEEK, a Web-based system of education and employment information housed at the Minnesota State Colleges and Universities; the Minnesota Career Information

System, a Web-based career planning tool provided for sale by the Minnesota Department of Education; and *Minnesota Careers*, a publication of career information. GPS Lifeplan, developed by Century College, also provides opportunities for career exploration.

BARRIER: COSTS AND FINANCIAL AID

Rationale for identification as a barrier: Financial barriers alone prevent nearly one-half of all college-qualified low-and moderate-income high school graduates from enrolling in a four-year program of college study. Beyond the barrier of cost is the challenge of timing. Many first-generation, college-going students are discouraged from applying, faced with potentially high expenses coupled with a lack of awareness about aid amounts. Annually, more than 405,000 students who successfully complete a college-prep curriculum in high school and are prepared to enter a four-year college will not do so (4.4 million a decade), and 170,000 will attend neither a two-nor a four-year college at all (about 1.7 million a decade). The Education Trust has reported that high-achieving students (defined as those who have successfully completed AP courses) of limited means have about the same chance of attending college (78%) as a low-achieving student from a wealthier background (77%).[xxxiv]

Examples of current strategies to address the barrier: An Ohio State University pilot program (2008) worked on six nights in six successive weeks to encourage African American families with children in the fifth and sixth grades in the state's large cities to begin early planning for college. They learned that:

- Aspirations for college attendance in minority communities are extremely high.
- African American parents need assurance that if their children follow recommended programs, they will not only be able to enroll in college but will also obtain the financial aid they need to attend.
- These parents insisted that the normal sequence of applying for admission and then learning about financial aid is backwards. Parents and families need assurances that they can finance the education before they are willing to apply, rather than after the application is completed.[xxxv]

In Minnesota, students can earn scholarship funds for successful completion of certain courses through the Achieve Scholarship program. The College of St. Kate's First Step summer program enables younger high school students to earn scholarship funds by participating.

BARRIER: HIGH SCHOOL TO COLLEGE TRANSITION

Rationale for identification as a barrier: College instructors estimate that approximately two in five public high school graduates, or 42%, were not adequately prepared by their prior education to meet expectations of college-level classes.[xxxvi] It is estimated that the U.S.'s financial loss due to remedial education for high school graduates is $3.7 billion.[xxxvii]

Evidence of the barrier's impact on Minnesota students: Within two years of high school graduation, 49 percent of the class of 2005 enrolled in a Minnesota public higher education institution. Of these students, 38 percent took one or more developmental courses during that period. Thirty-six percent of the 2005 graduates enrolled in developmental mathematics either alone or in combination with other skill areas.[xxxviii]

Examples of current strategies to address the barrier: Lincoln High School in Thief River Falls and Bemidji State University have implemented the Partnership Transition Point Course, which targets seniors and provides preparation for college placement math tests. The Rochester Area Math Science Partnership and Rochester Community and Technical College Networking Group pairs high school math faculty to work collaboratively to raise student performance in math and increase the number of students choosing to take math courses and pursue math-related career paths. MSU-Mankato's CAP program provides a bridge program to prepare students for their first year.

BARRIER: EIGHTH GRADE TO NINTH GRADE TRANSITION

Rationale for identification as a barrier: National 2007-08 ACT data reveals that of students who took the EXPLORE test, only 11% met all four EXPLORE Benchmark scores for students likely to be ready for college-level work. Only 35% met the benchmark in algebra, and 13% met the benchmark in biology.

Evidence of the barrier's impact on Minnesota students: Minnesota does not collect course grade data; however, data provided by ACT for 2007-08 Minnesota eighth graders who took the EXPLORE test indicate that only 18% met all four EXPLORE benchmark scores for college readiness. Only 46% met the benchmark in algebra, and 20% met the benchmark in biology.[xxxix]

Examples of current strategies to address the barrier: St. Louis Park High School has a successful, targeted ninth grade program which has won two national awards. Other examples of Minnesota high schools with Ninth Grade Academies, which have increased student achievement, are Owatonna, Denfield in Duluth, and Marshall.

Appendices D

RIGOROUS COURSE TAKING PATTERNS

The number of courses students are required to take has been on the rise for the past quarter century, but until recently, few states specified which courses students are required to take and set their graduation expectations at the appropriate level to ensure that graduates are prepared for success in college and the workplace.

More students than ever before now enroll in advanced courses like algebra II. Yet ample evidence suggests that the challenging content implied by the course title often falls short[xl]. This dilemma is worse for low-income students. For example, in Texas, 58% of low-income students, 67% of African American students, and 57% of Hispanics who received course credit for algebra I failed the corresponding end-of-course exam, while the percentages for higher-income and white students were 39% and 35%, respectively.[xli]

Math and science are key, especially for underrepresented students of color. The level of courses students take in high school is one of the best predictors of their success in college and the workplace. This is especially true in mathematics. Data show a strong correlation between taking higher-level math courses in high school and achieving success in college and employment in high-growth, high-performance jobs.[xlii]

Rigorous course taking is particularly important for students from disadvantaged backgrounds. Taking a challenging high school curriculum—including but not limited to content typically taught in algebra II—cuts in half the gap in college completion rates between white students and black and Latino students.

The task force recommends that the Minnesota education system provide college-ready rigorous curriculum that recognizes multiple ways of knowing and diverse learning styles.

ACADEMIC INTENSITY AND MOMENTUM

Clifford Adelman, in *Toolbox Revisited*, recommends the following course credits for all students in a school that is preparing all students to be college and career ready:

- 3.75 or more Carnegie units of English
- 3.75 of more units of math
- 2.5 or more units of science
- More than 2.0 units of foreign language, history, computer science
- More than one AP or other college-credit-bearing course while in high school
- Complete 20 or more credits in first year of college

The table below illustrates current Minnesota requirements compared with Adelman's recommendations.

<table>
<tr><th>Subject</th><th>Adelman's Recommendations</th><th>Minnesota's Requirement</th></tr>
<tr><td>English/language arts</td><td>3.75</td><td>4</td></tr>
<tr><td>Math</td><td>3.75 (highest level of calculus, precalculus, or trigonometry)</td><td>3, including algebra, geometry, and statistics and probability, and algebra in gr. 8</td></tr>
<tr><td>Science</td><td>2.5</td><td>3, including biology and either chemistry or physics</td></tr>
<tr><td>Foreign language</td><td rowspan="3">More than 2 units of foreign language, history, computer science</td><td rowspan="4">7 elective

3.5 social studies encompassing U.S. history, geography, world history, economics, and government/ citizenship.

1 arts</td></tr>
<tr><td>History/social studies</td></tr>
<tr><td>Computer science</td></tr>
<tr><td>Other</td><td>More than 1AP or other college-credit-bearing course</td></tr>
</table>

BENCHMARK SCORES FOR ASSESSMENTS OF ACADEMIC READINESS

These charts identify benchmark target scores that indicate that a student is on track for, or has achieved, readiness for college-level work. It is important to recognize that identifying a single benchmark target (or even a benchmark range) for these assessments can be misleading because the score range is narrow and the differences between scores can appear disproportionately large. Further, different postsecondary institutions (and even programs within a given institution) set different ACT benchmarks for admission. Since assessment data alone do not yield as much accurate predictive information as a composite of assessment data, student high school attendance, and student course taking, the reader is urged to consider these scores within that broader context.

(ACT defines readiness for college-level work as a 50/50 chance of earning a course grade of B or better or a 75% chance of earning a C or better in a typical entry-level college course)

Grade 8		
Subject	Benchmark Target Score	Assessment
English	13	EXPLORE is designed to help 8th graders explore a broad range of options for their future. It prepares students not only for their high school coursework, but for their post–high school choices as well. It marks an important beginning for a student's future academic and career success. http://www.act.org/explore/ppt/InterpVisual.ppt
Mathematics	17	
Reading	15	
Science	20	

Grade 10		
Subject	Benchmark Target Score	Assessment
English	15	PLAN is designed to prepare 10th graders for the ACT. It also lets you know if you're on track for college, points out your academic strengths and areas you need to improve, helps you find careers that match your interests, and connects you with more colleges interested in you. http://www.act.org/plan/ppt/InterpVisual.ppt
Mathematics	19	
Reading	17	
Science	21	

Recommended for targeted use at Grade 10 or 11		
Subject	Benchmark Target Score	Assessment
Reading	77.50	ACCUPLACER tests provide useful information about academic skills in math, English, and reading. The results of the assessment, in conjunction with academic background, goals, and interests, are used by academic advisors and counselors to determine course selection. http://www.collegeboard.com/student/testing/accuplacer/
Writing	77.50	
Elementary Algebra	75.50	
College Level Mathematics	49.50	

Grade 11 or 12		
Subject	Benchmark Target Score	Assessment
English	18	ACT asks questions directly related to what you have learned in your high school courses in English, mathematics, reading, and science. The ACT also provides a unique interest inventory that provides career and educational planning information and a comprehensive profile of a student's work in high school and his or her future plans. http://www.actstudent.org/scores/norms1.html
Mathematics	22	
Reading	21	
Science	24	

Grade 11 or 12		
Subject	Benchmark Target Score	Assessment
Reading	450	SAT Reasoning Test measures critical reading, mathematical reasoning, and writing skills that students have developed over time, both in and out of school, and that they need to be successful in college. SAT scores are intended to supplement your students' secondary school record and help them demonstrate their college readiness. http://www.collegeboard.com/student/testing/sat/about/ SATI.html
Mathematics	450	
Writing	450	

MATHEMATICAL COMPETENCE EXPECTED OF ALL ENTERING COLLEGE STUDENTS: STATEMENT OF THE JOINT MATH COMMITTEE, 2005

All students enrolled in two-year and four-year colleges or universities, regardless of their field of study, will take courses that require mathematical or quantitative competence. In most colleges, mathematics is necessary to meet general education requirements. In addition, students must understand and be able to apply mathematics in a variety of courses such as economics and biology that are taken outside their major. For these reasons, higher education institutions expect all entering students to be prepared for college-level mathematics. Many require students to demonstrate their readiness on college entrance exams or placement tests.

Achieving the level of competence necessary for college-level work requires that students enroll in a mathematically intensive course in every semester of high school, especially in their senior year. Like a foreign language, mathematical competence is easily lost unless practiced regularly. Many students who take no mathematics in the year before enrolling in college, even if they have completed three or more years of college preparatory mathematics, are unable to succeed in college courses of a quantitative nature without first taking remedial courses that carry no credit toward graduation.

WHAT IS MATHEMATICAL COMPETENCE?

Mathematical competence consists of five interdependent aspects that apply to all areas of mathematics:
- Deep understanding of mathematical concepts, operations, and relations;
- Skill in carrying out procedures accurately, efficiently, and flexibly;
- Ability to formulate, represent, and solve mathematical problems;
- Capacity for logical thought, reflection, explanation, and justification; and
- Seeing mathematics as sensible, unified, useful, and worthwhile.

To succeed in college, all students need to be proficient in these five aspects of mathematical competence in each of the following core content areas:
- Algebra (variables, equations, functions, and graphs);
- Geometry (axioms, deduction, geometric reasoning, trigonometry, and visualization);
- Data analysis (representations of data, probability, and statistics).

To achieve competence in these core content areas, students need to employ mathematical reasoning. In particular, students need to
- Understand the logical structure of mathematics;
- Recognize the roles of definitions, proofs, theorems, and counter-examples;
- Use both inductive and deductive reasoning to arrive at valid conclusions;
- Distinguish relevant from irrelevant information; and
- Employ the special symbols of mathematics correctly and precisely.

HOW DOES ONE ACQUIRE MATHEMATICAL COMPETENCE?

By taking challenging high school mathematics courses, by using mathematics in other courses, and by using mathematics frequently in a variety of settings. As with activities such as music or athletics, achieving and maintaining mathematical competence requires constant practice. The more one uses mathematics, the more competent one becomes.

DOES EVERY COLLEGE STUDENT NEED THE SAME MATHEMATICAL COMPETENCE?

No. While all students require mathematical competence at a level sufficient to succeed in college-level courses, students in mathematically intensive programs require greater mathematical depth and fluency than students in other programs. Although in the past only engineering and physics were considered mathematically intensive, in the twenty-first century, fields such as biology, economics, and psychology are becoming mathematically intensive as well. Well over half the majors of Minnesota college graduates are in fields that currently require at least four years of college preparatory mathematics, and in the future many more will expect that level of preparation. As a practical guide, it is always better to take as much mathematics in high school as possible so as not to foreclose possible fields of study.

IS CALCULUS IN HIGH SCHOOL NECESSARY TO SUCCEED IN COLLEGE?

Absolutely not. It is far better for high school students to acquire depth and competence in a broad variety of mathematical areas than to focus narrowly on completing calculus by the end of twelfth grade. Calculus courses in high school should be treated as college-level courses and should prepare students to do well on the College Board's Advanced Placement (AP) tests or other comparable external examinations. For many students, other advanced mathematics courses such as statistics or computer science would be preferable to calculus.

WHO DEVELOPED THESE RECOMMENDATIONS, AND WHY?

A joint committee appointed by the chief academic officers of Minnesota's three postsecondary systems: the University of Minnesota, the Minnesota State Colleges and Universities, and the Minnesota Private College Council. The purpose is to help students, parents, teachers, and taxpayers understand the nature of mathematical competence that students entering any college in these systems will be expected to have in order to succeed in college-level work.

DO THESE RECOMMENDATIONS CONSTRAIN SCHOOL CURRICULA?

Only on the side of quality. Students can become mathematically competent in integrated or traditional curricula, under text-based or project-based pedagogy, and in both traditional and block schedules. The only curricula that these expectations rule out are those that do not challenge students sufficiently.

WHAT IS THE SIGNIFICANCE OF THESE RECOMMENDATIONS?

As the report of the joint committee appointed by the heads of Minnesota's three higher education systems, they are designed to encourage conversation and to enable regular revision. This report is the initial phase in a consensus process that the joint committee hopes will gradually create common expectations for mathematics in Minnesota at the transition from high school to college. The committee welcomes thoughtful feedback and suggestions for improvement.

WHAT IS COLLEGE-AND CAREER-READY? ACHIEVE STATEMENT

> "I ask every American to commit to at least one year or more of higher education or career training. This can be community college or a four-year school; vocational training or an apprenticeship. But whatever the training may be, every American will need to get more than a high school diploma."
>
> President Obama, Address to Joint Session of Congress, February 24, 2009

It is commonly said that the goal of high school reform is to ensure all students graduate "college-and career-ready." But as often as this mantra is repeated, confusion remains over what it actually means. Much of Achieve's work to define college and career readiness to date has focused on the content knowledge and skills high school graduates must possess in English and mathematics – including, but not limited to, reading, writing communications, teamwork, critical thinking and problem solving. Readiness depends on more than knowledge and skills in English and math but these core disciplines undergird other academic and technical courses and are considered essential by employers and colleges alike.

To be college-and career-ready, Achieve believes high school graduates must have studied a rigorous and broad curriculum, grounded in these core academic disciplines but also consisting of other subjects that are part of a well-rounded education. Students must also possess the skills or habits of mind that enable them to apply their knowledge in a range of environments and situations.

WHAT IS "COLLEGE READY"?

College today means much more than just pursuing a four-year degree at a university. Being "college ready" means being prepared for any postsecondary experience, including study at two-and four-year institutions leading to a postsecondary credential (i.e. a certificate, license, associates or bachelor's degree). Being ready for college means that a high school graduate has the English and mathematics knowledge and skills necessary to qualify for and succeed in entry-level, credit-bearing college coursework without the need for remedial coursework.

WHAT IS "CAREER READY"?

In today's economy, a "career" is not just a job. A career provides a family-sustaining wage and pathways to advancement and requires postsecondary training or education. A job may be obtained with only a high school diploma, but offers no guarantee of advancement or mobility. Being ready for a career means that a high school graduate has the English and math knowledge and skills needed to qualify for and succeed in the postsecondary job training and/or education necessary for their chosen career (i.e. technical/vocational program, community college, apprenticeship or significant on-the-job training).

IS READY FOR COLLEGE AND READY FOR CAREER THE SAME THING?

With respect to the knowledge and skills in English and mathematics expected by employers and postsecondary faculty, the answer is yes. In the last decade, research conducted by Achieve as well as others shows a convergence in the expectations of employers and colleges in terms of the knowledge and skills high school grads need to be successful after high school.

Economic reality reflects these converging expectations. Education is both more valued and more necessary that ever before. The bottom line is that today ALL high school graduates need to be prepared for some postsecondary education and/or training.

Thirty five years ago, 28% of U.S. jobs required some postsecondary training, 12% an associate's degree, and 12% a bachelor's degree or higher. Today, over 80% of jobs require some postsecondary experience[xliii].

Nearly one-half of all job openings in the United States are be in "middle skill" jobs, all of which require at least some postsecondary education and training. By contrast, those with a high school diploma or less are eligible only for the one-fifth of all job openings that are deemed "low skill."

While the U.S. still ranks third in the adult population (25-64 year olds) with an associate's degree or higher among 30 countries, we now rank 10th among 25-34 year olds with a two-year degree and above. Competing countries are catching up to – and even outpacing – the U.S. in the educational attainment of their new generation of adults.

Higher levels of education lead to elevated wages, a more equitable distribution of income and substantial gains in productivity. For every additional average year of schooling U.S. citizens complete, the GDP would increase by about 0.37 percentage points – or by 10% – over time.

SYSTEMIC HIGH SCHOOL REDESIGN: BUILDING A MINNESOTA MODEL FRAMEWORK

The intent of the *Systemic High School Redesign: Building a Minnesota Model Framework* is to guide high schools in helping all students achieve, at a minimum, a P-14 education that will enable them to develop a strong work ethic, gain competitive employment, pursue lifelong learning, become engaged citizens for the 21st century, and enhance their quality of life by providing research-based information and resources to support the five core components of the initiative.

CORE COMPONENTS INCLUDE:

- Rigorous and relevant course-taking for all students, especially at transition points.
- Personalized learning environment for each student, with the support of parents and other adult mentors.
- Multiple pathways to postsecondary training or college to achieve a minimum K-14 education.
- High-quality teacher and principal leadership.
- Student assessment and program evaluation data used to continuously improve school climate, organization, management, curricula and instruction.

Thirty-three high schools have been actively engaged in the initiative in four Minnesota Association of Secondary School Principals (MASSP) Divisions (Northern, Northeast, Southwest, and Central) in 2008-2009. The initiative will be expanded to four more MASSP Divisions (Western, Southeast, Hennepin, and Capitol) in 2009-2010.

Systemic High School Redesign: Building a Minnesota Model Framework is available online for all high schools to assist with their high school improvement initiatives. The framework lists ideal characteristics of the research-based five core components for high school improvement. For each of the characteristics, the framework provides lists of possible tools to measure these characteristics, potential strategies for implementation, possible resources to explore, and advisor guidance. Supporting individual high school improvement plans is a priority, yet one redesign model does not fit all schools. We recognize how challenging it is to redesign a complex high school to educate all students for a growing global economy.

Systemic High School Redesign: Building a Minnesota Model Framework was developed by the Minnesota Department of Education in conjunction with NCCC (North Central Comprehensive Center)/McREL (Mid-Continent Research for Education and Learning) during the first two years of the pilot initiative. Principals involved in the pilot also contributed to the Framework.

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