COLORADO COMMUNITY
COLLEGE SYSTEM

COLORADO COMMUNITY COLLEGE SYSTEM
REPORT ON REMEDIAL EDUCATION

November 2006

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COLORADO COMMUNITY COLLEGE SYSTEM
REPORT ON REMEDIAL EDUCATION

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The Colorado Paradox

Despite the fact that Colorado ranks among the top states in percentage of the population with a college degree, the state ranks very low in educating its native population. This dilemma – called the "Colorado Paradox" -- describes a situation where Colorado is importing an educated workforce from other states, while at the same time, not successfully transitioning its own high school students through the educational pipeline to college graduation.

The rate that Colorado graduates its high school students ranks the state 26th in the nation. According to the National Center for Higher Education Management Systems (NCHEMS), based on 2000 data, 71 out of every 100 Colorado ninth graders graduate from high school, 37 enter college, 26 are still enrolled their sophomore year, and 18 graduate within 150 percent of expected time. The issue of low college attainment is both a local and national problem, one that is intertwined with the complex challenge of remediation in postsecondary education.

Economic Impact of Educational Attainment

With the application of new technologies and business strategies affecting all occupations, the skill content of even lower level jobs has dramatically increased. The economy is pushing future and current workers toward postsecondary education, and the economic bias toward postsecondary education and training is steadily increasing.

The importance of postsecondary skill development has not been lost on the American worker. According to the National Household Education Survey (NHES), the estimated number of adults age 25 and older in any form of adult education increased from 58 million in 1991 to 90 million in 1999, an increase of more than 50 percent in less than a decade. NHES estimated that in 2002, almost four million adults age 25 and older whose educational attainment was a high school diploma were attempting to get a postsecondary credential. A large number of these adults are enrolling in community colleges.

Clearly, many under-prepared adult workers have come to the conclusion that it is in their interest to acquire more education and skills. As these working adults look toward community colleges to provide this training, they increase the pressure on the remediation challenge that faces community colleges across the United States.

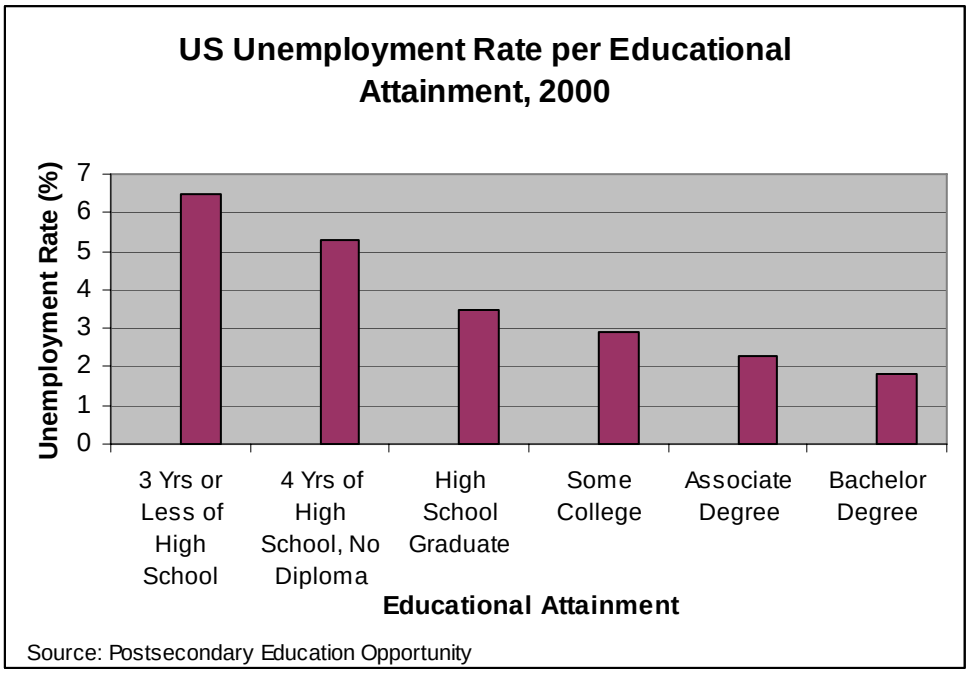
Despite this growing trend, there are still more than a million Colorado adults age 25 and older – about 36 percent of the total population – who have no postsecondary education. Adults with no postsecondary education tend to come from lower income families, with low parental educational attainment, and often are minority. These demographics describe the very population that -- as open access institutions -- community colleges strive to serve. Without the ability to access higher education, many of these families will continue in a cycle -- generation after generation, working in low-skill, low-wage jobs.

The consequences of not obtaining postsecondary education pose serious financial risk for Coloradans. In Colorado, the average hourly wage for all occupations requiring postsecondary education is $28.58, versus an average of $15.89 for those jobs that do not require some form of postsecondary training. In Denver County, this average wage of $15.89 falls far below the minimum self-sufficiency wage for a family of four at $22.76 per hour for one working adult, nor is it sufficient for a single parent with one or two children (Colorado Fiscal Policy Institute, 2004).

For comparison purposes, the annual self-sufficiency income in Denver County for a family of four is $47,341. A self-sufficiency income is the minimum threshold needed for a family to meet its basic needs without assistance, but does not include items such as savings, credit card payments, restaurant take-out, vehicle repairs, etc. Based on 1999 data (US Census), there were almost 42,000 Denver County families earning less than the self sufficiency wage, and because the income brackets are aggregated by “less than $35,000” to “less than $50,000”, in reality that number is probably higher.

Educational attainment also influences the likelihood of unemployment. In 2000, Americans with a high school diploma were half as likely to be unemployed than those without, and those who had earned an associate degree were almost three times less likely to be unemployed. Exhibit 1 shows the unemployment rate per educational attainment.

Exhibit 1



Source: Postsecondary Education Opportunity

Unemployment rate varies inversely with education level.

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Issue

- Postsecondary education is increasingly required to earn enough to support a family. More adults are seeking higher education.

Policy Implication

- Colorado needs to provide greater access to higher education and provide support for adults seeking higher education.

Remediation in Postsecondary Education

A critical factor that influences college success is the level of preparation for college-level coursework. Remediation has become a necessary part of postsecondary education in America with almost 80 percent of postsecondary institutions offering remediation and nearly one-third of all postsecondary students taking at least one remedial education course. Based on transcript data available from the National Educational Longitudinal Study (NELS: 88), Attewell, et al. reported that 58 percent of community college students take at least one remedial course.

Survey data indicates that the number of students presenting at the community college level in need of remediation is increasing. In 1991 the National Center for Education Statistics (NCES) found that 36 percent of students entering public community colleges enrolled in at least one remedial course. By 2000 that figure had increased to 42 percent.

The issue of college readiness transcends both four-year university and two-year college students. According to the Colorado Commission on Higher Education, roughly one-third of first-time recent Colorado high school graduates beginning college require remedial coursework, with 18 percent of those students enrolling at four-year institutions and 55 percent enrolling in community colleges.

Demand for remediation is increasing -- not just because more students need it -- but because students need more of it. NCES research demonstrates that the time spent in remediation has increased significantly. From 1995 to 2000, the percentage of students who enrolled in remediation in public two-year institutions for one semester decreased from 45 to 37, while the percentage of students who were enrolled in remediation for two semesters increased sharply from 44 to 54.

The reason for the increase in the numbers of recent high school graduates needing substantial remediation is not entirely clear. The lack of alignment between high school curriculum and college-level work certainly contributes to the problem. However, some researchers interpret the increase in remedial need as reflecting an increasingly larger percentage of high school graduates who are attempting college who would have not attempted college some years ago, a group that includes many students without college-level skills.

Issue

- Of the one-third of matriculating high school students who require remediation, 55 percent enroll in community colleges.

Policy Implication

- Higher education institutions should seek to reduce the number of high school students not prepared for college level-coursework, by aligning secondary and postsecondary curriculum. In addition, community colleges should work with the K-12 system on strategies such as: early and middle colleges articulated career pathways through CTE (Career and Technical Education) summer bridge programs

Issue

- The need for remediation is increasing, both in terms of the number of students requiring it and in the number of courses needed per student to be prepared for college level coursework.

Policy Implication

- Colorado Community College System (CCCS) colleges need to anticipate a growing number of remedial students and focus on the successful completion of remediation as a critical element in overall student success.

Impact of Time in Completion of Remedial Sequence

The increase in time spent in remediation has serious implications for student success. Research by Norton Grubb and Cliff Adleman shows that the longer students spend in remediation the less likely they are to graduate. Grubb's 1998 research concluded that, of students who require nine or more credits in remedial courses (the equivalent of three remedial courses), only about 25 percent will complete all of their remedial courses and only about 4 percent will complete a degree within five years of initial enrollment. Several recent studies of remedial students show that remedial students who persist and complete the remediation sequence are just as successful in college as students who enroll directly into college level work. However, the low retention rate of remedial students poses an ongoing and serious challenge.

Issue

- Students are requiring more remediation, and research indicates the longer the remediation sequence, the less likely they are to persist and graduate.

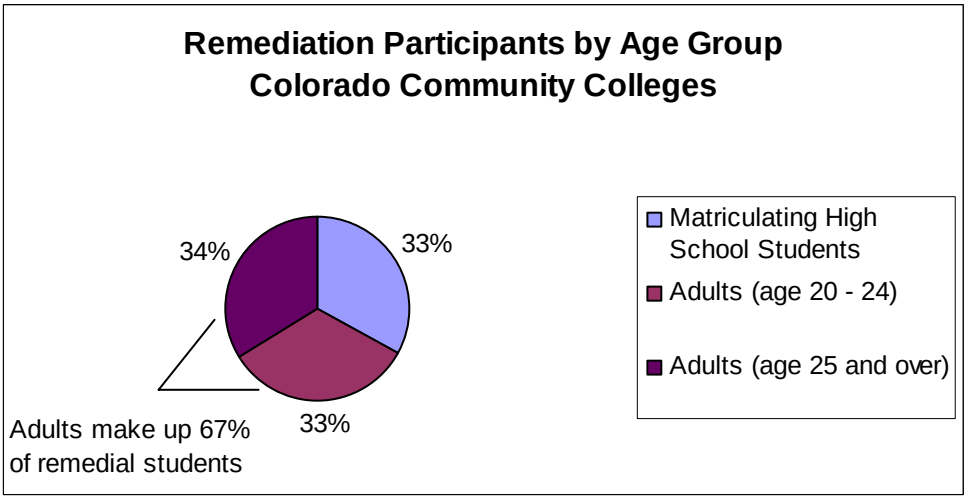
Policy Implication

- The Colorado Community College System should expand existing best practices in remediation that enable students to complete the remediation sequence more quickly, such as hybrid developmental courses that combine on-line delivery with on-site instruction, accelerated courses, accelerated developmental learning communities, online developmental courses and expanded weekend delivery.

Adult Remediation Issues

Remediation isn't just an issue for matriculating high school students. Exhibit 2 shows that 67 percent of remedial students are 20 years of age or older. Of the approximately 36,000 adults age 25 and older enrolling in Colorado community colleges in 2004, roughly half required remedial coursework. Many of these older students completed their high school requirements under less demanding circumstances and did not expect to be employed in jobs that require postsecondary education.

Exhibit 2



About two-thirds of remedial students in fall 2005 were older than 20 years of age, indicating that CCCS colleges serve a significant proportion of adults in remedial programs.

Adults who do not use skills routinely are highly likely to lose them. Therefore, the remedial needs of this population are not surprising. Even someone who excelled in trigonometry as a high school junior is likely to forget what she learned after a few years away from education. For those who were underserved academically, dropped out, or earned a GED, the need for remediation as a precursor for college-level work is likely to be more pronounced. Once out of school, skills that are not practiced deteriorate. This may be most pronounced in the area of mathematics. Even college graduates may not be able to answer college algebra questions. Example Accuplacer™ test questions are provided in Exhibit 3.

Exhibit 3

The following sample questions are similar to the format and content of questions on the Accuplacer™ Elementary Algebra test.

$$\frac{4^2 - 5^2}{(4-5)^2}$$

Write the following in scientific notation: 0.0000000000000523

4a2 + 9a + 2 = 0

Answers to these problems are in Appendix 1.

Issue

- Approximately half of returning adults require remedial education, and make up the largest percentage of CCCS remedial students.

Policy Implication

- Remedial programs at community colleges should connect to Adult Basic Education and partner with employers to provide opportunities for adults to prepare for college-level work, which requires the same skill sets needed in employment (ACT). In addition, the colleges should provide an opportunity for adults to review their skills before placement into remediation - by offering short-term bridge programs following initial assessment.

Colorado Remediation Policy

In l991, Colorado House Bill 91-1464 mandated that students enroll in the appropriate levels of English, reading and math, based on their Accuplacer assessment scores. Colorado's decision to implement mandatory assessment and placement corresponds with a national trend in community colleges.

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In 2000, the Colorado Commission on Higher Education (CCHE) adopted its Statewide Remedial Education policy which outlines standards and procedures for basic skills testing and instruction at the state's public colleges (Appendix 2). Only Adams State, Mesa State, CCCS colleges, Aims Community College and Colorado Mountain College may receive state funding for basic skills instruction on behalf of eligible undergraduate students, according to Colorado Statute 23-1-113.3. (Appendix 3).

Financial aid eligible students who have a high school diploma or GED and who enroll in these courses qualify for federal and state assistance. These courses do not count toward completion of the degree or certificate requirements of college programs. However, they are eligible for the Colorado Opportunity Fund (COF) stipend and do not count against the total number of life-time COF credits.

For academic year 2004, the CCCS total remedial credit hours were 121,631 and total remedial FTE was 4,054. The CCCS total appropriation for remedial instruction for the same time period was $8,542,230, eight percent of the total state appropriation. Most recently, remedial education accounted for approximately 13 percent of the total state appropriation in our colleges for 2005-06.

The Colorado Community College System structures remedial courses in three levels; Reading 030, 060 and 090; Writing 030, 060 and 090; and Math 030, 060 and 090. Exhibit 4 shows that of matriculating high school graduates requiring remediation, the greatest demand and lowest pass rate were for remedial math.

Exhibit 4

	All Colorado First-Time Recent High School Graduates, Fall 2004	Colorado Community College System Remedial Students, Fall 2004
Subject	Required Remedial Course	Pass Rate
Reading	45%	73.5%
English	47%	72%
Math	83%	68%

Percentage of remedial course requirements by subject and pass rates of those matriculating high school graduates requiring remediation in fall 2004.

The combination of a greater need and lower success rate for remedial math courses is significant because math skills are increasingly critical to the state's economy. In the next decade and beyond, Colorado is expected to continue moving toward a knowledge-based economy with jobs that require successful mastery of science, technology, engineering, and math (STEM) skills. The Colorado Institute of Technology recently reported that the aerospace and energy sectors, both critical high-growth sectors in Colorado's economic development forecast, predict a 70 to 75 percent turnover because of retirement, and the bioscience sector anticipates major job growth within the next 15 years. These technical sectors all require college level math skills.

Issue

- The low pass rate in remedial math courses and the critical role of math skills in the knowledge economy signal that math is the area of remediation that requires the greatest attention.

Policy Implication

- Colorado community colleges should focus additional attention and resources to improve delivery of instruction resulting in greater student success in remedial math courses.

Demographic Trends in Remediation

The need for remedial education cuts across all income brackets, but a higher number of low income students require it. In Colorado, a greater percentage, by population, of remedial students is African American, Hispanic, or Native American than white or Asian (Exhibit 5). In addition, females are slightly more likely than males to require remediation (CCHE). Nationally, although the majority of remedial students are white, minority groups are also overrepresented.

Exhibit 5

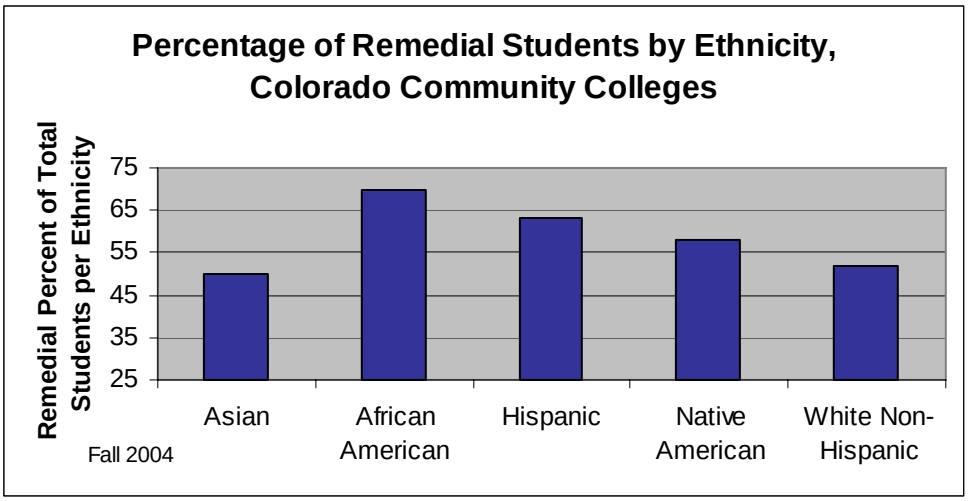

Exhibit 5: Racial and ethnic minorities constitute significant proportions of community college enrollment in remedial courses. The chart represents the percentage of total students per ethnicity that were assigned to remedial education.

Demographic projections indicate that the need for remedial education will continue to grow. Between 2000 and 2020, the Colorado Hispanic working age population is expected to increase by 39 percent. Yet, Hispanics in Colorado have the lowest educational achievement as a group. Nearly 42 percent of Colorado Hispanic adults have no high school diploma and only 15 percent have some form of postsecondary degree. This percentage of educational attainment compares with 16 percent of African Americans lacking a high school diploma and 29 percent with a post-high school degree (Exhibit 6). Further, the gap in educational attainment between whites and non-whites has grown significantly over the past decade, with Colorado posting the widest gap of any state.

Exhibit 6

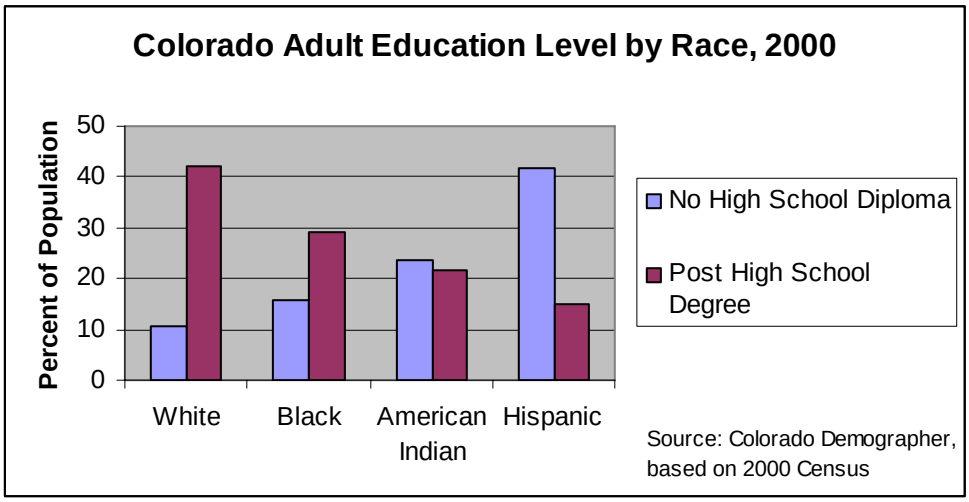

Exhibit 6: Colorado adult educational achievement by race indicating overall low Hispanic achievement.

The changing demographic composition of the population, combined with the educational attainment gap for Hispanics will translate into a serious economic issue if Hispanic students are unable to successfully access and graduate with postsecondary education. The economic impact will affect not only these families, but also the state in terms of decreased per-capita income of Colorado's citizens combined with increased demand for public assistance. As this population attempts to access education resulting in a livable wage, there will be an increased need for remedial education. The added burden will be placed on our state's community colleges, which function as gateways to higher education and serve the largest minority populations.

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Issue

- Minorities and low income students comprise a greater proportion, by population, of remedial students.

- The Hispanic working-age population in Colorado is expected to increase by more than a third in coming years. As a result of the demographic shift, remedial education will be in ever-greater demand in the foreseeable future.

Policy Implication

- Colorado community colleges should develop appropriate marketing tools to promote access to minority populations, strengthen English as a Second Language (ESL) programs and provide transitions from ESL to developmental education and college level programs. The links between the state's Adult Basic Education (ABE) programs and community colleges need to be strengthened to transition those students into the educational pipeline. Finally, partnerships with employers should be established to prepare workers for college-level work and to create career pathways.

Best Practices in Remedial Education

There are several national organizations that focus on developmental education, such as the National Association of Developmental Educators (NADE) and the National Center for Developmental Education. One of the key principals and researchers in the field is Hunter S. Boylan, who synthesized research in developmental education in his 2001 publication, What Works in Remediation: Lessons from 30 Years of Research. A key remediation practice, highlighted by Boylan and championed by Vincent Tinto, is the concept of learning communities. Learning communities combine two elements that appear to result in higher course completion rates and retention for remedial students: cohort learning and the application of skills in meaningful contexts. These communities may pair a skills-based course with a content course; for example, a college preparatory course in reading with a sociology course. Students in learning communities spend more time together than they would in unpaired courses and are encouraged to develop social networks with other students in their cohort. Researchers have found higher levels of student satisfaction, course completion, and semester-to-semester retention among remedial and community college students who participate in learning communities. A complete list of Boylan's best practices is in Appendix 4, Boylan's Research-Validated Best Practices in Remediation.

Several strategies cited by Boylan, such as learning communities and learning laboratories, are being implemented in Colorado community colleges. Academic support programs, organized through learning laboratory programs, are the backbone of a strong developmental program. Learning labs, known technically as vestibule labs, are supported in Colorado through a fee-for-service contract with the Colorado Commission on Higher Education (CCHE), although the extent of their use varies greatly. Research shows that a key factor in the effectiveness of learning lab programs is the quality of training for tutors to work in small group and individualized settings. However, professional development for the adjunct faculty who staff these labs is not generally funded. Another remediation strategy that is growing in use is the college orientation course, currently offered at several community colleges as a one-credit course. AAA College 101 takes students through topics such as time management, study skills, student supports, educational planning, financial aid and negotiating college systems.

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Overall, Colorado community colleges have identified and are implementing a number of best practices in remediation, although the number and scale of these strategies, the degree in which they are being implemented and the funding that supports them varies by institution.

Issue

- Best practices in remediation, involving various methods of instruction, student support and institutional practice, have been demonstrated to increase remedial retention and success.

Policy Implication

- The Colorado Community College System should provide support to colleges by facilitating a comprehensive assessment of current college strategies in the delivery of quality remedial education, as defined by best practices and outcome assessments.

Colorado Community College System Remediation Practices – Recent Efforts to Improve Remediation

CCCS often has served as the fiscal agent and coordinating structure for federal, state and foundation grants. The preference for funding state and regional consortia as opposed to funding individual colleges is emerging as a trend in certain segments of the grants community. These funders see system initiatives as a way to gain access to the policy agenda and thereby increase the likelihood that the practices and innovations implemented through their resources will be sustained after the conclusion of the grant period. As a result, state community college systems are becoming more competitive in securing foundation and federal grants from grantors whose goals include impacting state policy.

A recent 2004 grant of $649,000 from the Lumina Foundation for Education to the CCCS Education Foundation to improve outcomes for academically under-prepared students illustrates the trend towards systems grants with a goal toward the institutionalization of best practices. The Colorado Lumina Initiative for Performance was designed to build on the existing capacity of developmental education at three metro community colleges: Community College of Aurora (CCA), Community College of Denver (CCD), and Front Range Community College (FRCC), to support the implementation of new strategies at each of the colleges, to evaluate the costs and outcomes of these strategies and to promote institutional change based on project findings. The primary project objectives were improved student outcomes and a cost analysis of best practices that could be utilized by colleges in the strategic planning process.

The first phase of the Lumina project, which ended in August, 2006, demonstrated strong outcomes for specific strategies and a strengthening of continuous improvement processes within the colleges. As part of the grant process, each college worked with the grant leadership team to assess the college's capacity to serve the developmental population, to select appropriate strategies that would strengthen services to this population and to evaluate both the costs and the outcomes associated with these strategies. The outcome measures of the project were the same measures used by the 26 community colleges of the Lumina funded Achieving the Dream initiative: completion of remedial instruction, passage of gatekeeper courses -- like Math 101 and English 101 -- course completion, retention, and certificate and degree attainment.

CCD implemented two strategies, English as a Second Language learning communities and accelerated developmental education learning communities. CCA implemented a mentoring program, which they later replaced with the introduction of a college orientation course and professional development program for developmental faculty, coupled with a tutoring program. FRCC implemented a professional development program for developmental education faculty and a hybrid developmental education learning community. All of these strategies fall under the research-validated practices identified by Boylan. What was key to each of the colleges was the ability to assess their own programs and build strategies that address the needs and capitalize on the distinctive strengths and resources of each college.

Based on the success of early outcomes at all three participating colleges, the Lumina Foundation recently awarded a supplemental grant of $324,000 to the CCCS for an additional two years. During this time, colleges will continue the successful strategies begun in the first phase of the grant, as well as track and analyze the costs and outcomes of these practices. Another major goal of the supplemental grant is the institutionalization of these practices within the colleges and the replication of best practices throughout the system.

While some of the variability in the degree of implementation of best practices in CCCS colleges is a result of individual college leadership, the greatest variation results from the availability of external funding to support these practices. Many college administrators and faculty understand the importance of these strategies and work aggressively to secure external funds for activities like learning communities, supplemental instruction, curriculum development, professional development and enhanced student services. For the most part, grants that support the implementation of research-validated best practices are targeted to specific populations, such as first generation students or students with disabilities.

Grant-funded programs are an important source for bringing innovations to the colleges and raising the colleges' profiles in the community, but the numbers served by grants are generally small compared to the numbers of students who need similar services. A second downside of grants is that they are time-limited, which discourages the institutionalization of strategies. Some of these time-limited grants, like TRiO and Carl Perkins, come up for renewal at regular intervals, while others are one-time opportunities. In many cases, a condition of these one-time grants is that services started under the grants will be institutionalized after the grant period has ended. This type of financial commitment was particularly difficult for colleges in the past five years, when state funding was drastically reduced and colleges struggled to reduce existing costs at the same time as they sought to honor their commitments to institutionalize grant-funded programs.

For the most part, key strategies that are associated with excellence in developmental education are not being offered in Colorado because of the lack of stable funding. For example, full staffing of vestibule labs with professional tutors exceeds the revenue the labs generate. Tutoring, while available through Carl Perkins, is limited to vocational students and usually is exhausted before the end of each semester. Professional development and strong student advising -- both key remediation strategies -- are not provided for through state funding. Learning communities and supplemental computer-based instruction, two other significant strategies, are being implemented at some campuses, but once again the costs fall outside of the traditional funding formula.

Issue

- Pockets of excellence with best practices in remediation have been developed in colleges throughout the system, but are serving only small discrete populations.

- CCCS colleges do not have a consistent source of funding to cover the costs of implementing an effective array of best practices.

Policy Implication

- The system should create a strategic plan that will support the development, implementation, and institutionalization of best practices in remediation across the Colorado Community College System, including providing funding for the assessment and implementation processes that will bring these strategies to scale across the system.

CONCLUSION

The shift to the knowledge-based economy will require more Colorado residents to complete a postsecondary education in order to earn a self-sufficient wage. High school alignment issues, the increase in low-skilled adults seeking postsecondary education, and the growing Hispanic population will result in greater remedial education demands, the most significant of which is math. Although students who complete the remediation sequence are as successful as non-remedial students in college courses, increasing the persistence rate of remedial students remains a serious challenge.

While CCCS has improved in minority enrollment, retention and graduation measures, there is still a large gap in educational attainment between minorities and whites. As a system, we need to continue to implement new and innovative methods of improving both access and success for the underserved population. Reducing the need for, as well as improving the delivery of remedial education to include adoption of evidence-based best practices, is necessary to improve minority access and success in postsecondary education.

Best practices involving alternative curriculum and instruction strategies coupled with student supports have been shown to increase overall remedial retention and success. Some of these methods have been practiced within small populations in several CCCS institutions and have provided direct evidence of improved outcomes. While certain aspects of remedial education are funded, the majority of best practices are not -- forcing colleges to rely on intermittent external funding. The challenge for CCCS is to institutionalize research-validated best practices across the colleges in order to promote success of its remedial student population, transition these students into college-level coursework, and ultimately enable these students to enter the workforce and earn a livable wage.

Implementing policies that strengthen remediation will help provide Colorado's employers with the skilled labor force they require, thereby reducing the need for importing educated workers from other states. In addition, educating our own workers will enable more of Colorado's residents to support a family with a livable wage, adding to the economic vitality of the state and decreasing the demand for public assistance.

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Summary of Issues and Policy Implications

Issues	Policy Implications
Postsecondary education is increasingly required to earn enough to support a family.	Colorado needs to provide greater access to higher education and provide support for adults seeking higher education.
More adults are seeking higher education.	
Of the one-third of matriculating high school students who require remediation, 55 percent enroll in community colleges.	Higher education institutions should seek to reduce the number of high school students not prepared for college level-coursework, by aligning secondary and postsecondary curriculum. In addition, community colleges should work with the K-12 system on strategies such as: • early and middle colleges • articulated career pathways through CTE (Career and Technical Education) • summer bridge programs
The need for remediation is increasing, both in terms of the number of students requiring it and in the number of courses needed per student to be prepared for college level coursework.	Colorado Community College System (CCCS) colleges need to anticipate a growing number of remedial students and focus on the successful completion of remediation as a critical element in overall student success.
Students are requiring more remediation, and research indicates the longer the remediation sequence, the less likely they are to persist and graduate.	The Colorado Community College System should expand existing best practices in remediation that enable students to complete the remediation sequence more quickly, such as hybrid developmental courses that combine on-line delivery with on-site instruction, accelerated courses, accelerated developmental learning communities, online developmental courses and expanded weekend delivery.
Approximately half of returning adults require remedial education, and make up a large percentage of CCCS remedial students.	Remedial programs at community colleges should connect to Adult Basic Education and partner with employers to provide opportunities for adults to prepare for college-level work, which requires the same skill sets needed in employment (ACT). In addition, the colleges should provide an opportunity for adults to review their skills before placement into remediation - by offering short-term bridge programs following initial assessment.
The low pass rate in remedial math courses and the critical role of math skills in the knowledge	Colorado community colleges should focus additional attention and resources to improve

Issues	Policy Implications
economy signal that math remediation is the area of remediation that requires the greatest attention.	delivery of instruction resulting in greater student success in remedial math courses.
Minorities and low income students comprise a greater proportion, by population, of remedial students.	Colorado community colleges should develop appropriate marketing tools to promote access to minority populations, strengthen English as a Second Language (ESL) programs and provide transitions from ESL to developmental education and college level programs. The links between the state's Adult Basic Education (ABE) programs and community colleges need to be strengthened to transition those students into the educational pipeline. Finally, partnerships with employers should be established to prepare workers for college-level work and to create career pathways.
The Hispanic working-age population in Colorado is expected to increase by more than a third in coming years. As a result of the demographic shift, remedial education will be in ever-greater demand in the foreseeable future.	
Best practices in remediation, involving various methods of instruction, student support and institutional practice, have been demonstrated to increase remedial retention and success.	The Colorado Community College System should provide support to colleges by facilitating a comprehensive assessment of current college strategies in the delivery of quality remedial education, as defined by best practices and outcome assessments.
Pockets of excellence with best practices in remediation have been developed in colleges throughout the system, but are serving only small discrete populations.	The system should create a strategic plan that will support the development, implementation, and institutionalization of best practices in remediation across the Colorado Community College System, including providing funding for the assessment and implementation processes that will bring these strategies to scale across the system.
CCCS colleges do not have a consistent source of funding to cover the range of remedial education costs to implement an effective array of best practices.	

Next Steps

1. Implement a culture of evidence that will allow the system, as well as faculty and administrators at the college level, to assess what's working and to adopt practices that improve student outcomes.

    - Work with colleges to track the rate at which cohorts of students: a) complete remedial instruction by subject area, and b) take and pass gatekeeper math and English. Disaggregate the results by student age, race/ethnicity and gender (to identify substantial gaps among different student groups).

        - **Status: In process through funding from the Ford Foundation Bridges to Opportunity Project.**

    - Convene groups of faculty involved in teaching remedial courses and those involved in teaching college-level courses along with student support staff. As a group, the objective is to examine carefully the data on the progress and outcomes of students in remedial and gatekeeper courses, assess the effectiveness of current or past efforts to address problems in student achievement; and devise strategies for addressing the gaps in student achievement.

        - **Status: We are building the capacity and plan to review the data on this level, but the structures to implement the above process will require planning and additional funding.**

2. Plan strategically to provide structures for college leadership and faculty to engage with and improve remediation practices at the system and college levels, including the dissemination of tools that help colleges evaluate the cost-effectiveness of specific practices in terms of retention and success.

    - Develop a cost/benefit tool tied to student outcomes that that could be used by the system and by individual colleges for strategic decision-making.

        - **Status: A pilot cost/benefit analysis tool was developed under the Lumina grant. A pending grant from the Ford Foundation's Bridges to Opportunity Project will support the development of a business model that can be used in the strategic planning process.**

    - Implement the college assessment process developed during the Lumina grant across the system to determine the current capacity of colleges to deliver high quality remediation, followed by distribution of innovation funds for the colleges to institute or expand best practices.

        - **Status: This process was developed and used successfully in the Lumina grant. Further funding would be required to replicate the process at other colleges.**

3. Organize key collaborative structures that will facilitate communication between different groups of educators and policy makers to support improved practice.

    - Bring together college faculty with high school teachers in math and English to examine data on the need for remediation of incoming students by high school and subject area, compare the assessments, curricula and program standards at each level, and devise strategies for improving the readiness of high school students for college.

- ♦ **Status: Some efforts are taking place in this arena at the college level. However, a coordinated system effort is subject to available resources.**

- Bring together administrators from across the colleges to discuss ways to engage faculty and staff in the process of data-based decision-making that will lead to improved student outcomes.

  - ♦ **Status: Long-term recommendation that will coincide with implementing a culture of evidence.**

- Partner with the workforce, Adult Basic Education and K-12 systems, including Career and Technical Education, to align curriculum and leverage resources to prepare more youth and adults for college level work and employment.

  - ♦ **Status: Long-term recommendation that will require additional coordinated efforts.**

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APPENDIX 1

Answers to Accuplacer™ Practice Questions

1) $\frac{4^2 - 5^2}{(4 - 5)^2}$

The answer is -9. When working with parentheses, exponents, multiplication, division, addition and subtraction, the order of operations should be followed. First, address parentheses or exponents as one calculates from left to right, followed by multiplication and division and then addition and subtraction. .

2) Write the following in scientific notation: 0.0000000000000523

The answer is $0.0000000000000523 = 5.23 \times 10^{-14}$. All numbers in scientific notation have the following form: nonzerodigit.restofnumber ×10power

3) $4a^2 + 9a + 2 = 0$

The answer is:
$4a^2 + 9a + 2 = 0 \rightarrow (4a + 1)(a + 2) = 0 \rightarrow 4a + 1 = 0$ or $a + 2 = 0$

$\rightarrow$ $a = -\frac{1}{4}$ or $a = -2$

Steps:
1) Isolate zero on one side of the equation
2) Factor
3) Set each factor to zero
4) Solve for your variable

If you can not factor the equation and the quadratic is in the form ax bx c 0 2 + + = , then use the quadratic formula.

SECTION I

PART E STATEWIDE REMEDIAL EDUCATION POLICY

1.00 Introduction

This policy is designed to ensure that:

- All enrolled first-time undergraduate students (as defined in section 3.04) are prepared to succeed in college-level courses.
- Students assessed as needing remedial instruction have accurate information regarding course availability and options to meet the college entry-level competencies**.**
- Colorado public high schools are informed about the level of college readiness of their recent high school graduates.

The policy applies to all state-supported institutions of higher education (i.e., four-year and two-year colleges), including all entering undergraduates and freshmen admitted into extension programs of the state-supported universities and colleges. The governing boards and institutions of the public system of higher education in Colorado are obligated to conform to the policies set by the Commission within the authorities delegated to it by C.R.S. 23-1-113.3.

> **Commission directive – basic skills courses.** (1) ON OR BEFORE SEPTEMBER 1, 2000; THE COMMISSION SHALL ADOPT AND THE GOVERNING BOARDS SHALL IMPLEMENT STANDARDS AND PROCEDURES WHEREBY BASIC SKILLS COURSES, AS DEFINED IN SECTION 23-1-113 (4) (c), MAY BE OFFERED BY STATE INSTITUTIONS OF HIGHER EDUCATION PURSUANT TO THIS SECTION.

2.00 Role and Responsibilities

2.01 Commission Role and Responsibilities

2.01.01 To design and implement statewide policies for remedial education.

2.01.02 To provide the General Assembly information on the number, type, and cost of remedial education provided.

2.01.03 To develop appropriate funding policies that support the institutional roles and missions.

2.01.04 To ensure the comparability of these placement or assessment tests.

2.01.05 To ensure that each student identified as needing basic skills remedial course work is provided with written notification identifying which state institutions offer such basic skills courses and the approximate cost and relative availability of such courses, including any electronic on-line courses.

2.02 Governing Board Role and Responsibilities

2.02.01 To ensure that each enrolled first-time undergraduate enrolled at one of its institutions is assessed in mathematics, writing, and reading prior to enrolling in the second semester of their college career. If the student has completed one of the following within the past five years, no additional assessment is required:

2.02.01.01 scored a 19 or higher mathematics subscore, an 18 or higher writing (English) subscore, and a 17 or higher reading subscore on the ACT Assessment Test; or

2.02.01.02 scored 430 or higher on the SAT Verbal (English) for reading, 440 or higher on the SAT Verbal (English) for writing, and 460 or higher on the SAT mathematics; or

2.02.01.03 scored 85 or higher on the Accuplacer Elementary Algebra test, 95 or higher on the Accuplacer Sentence Skills test, 80 or higher on the Accuplacer Reading Comprehension test; or

2.02.01.04 met one of the following criteria for exemption from assessment. In addition to those listed in section 3.04.02, exemptions include students who:

a) have successfully completed a college-level mathematics and college-level writing course; or

b) have successfully completed necessary remedial course(s), if required, in mathematics, writing, and reading.

Note: Successfully completed refers to a student who earns a grade of C- or higher or a Satisfactory completion.

2.02.02 To ensure that each enrolled first-time undergraduate whose assessment score indicates inadequate college preparation in mathematics, writing, and reading has the appropriate advising information regarding the necessity to enroll in remedial skill classes during the first semester following a placement test.

2.02.03 To ensure that each enrolled first-time undergraduate shall take placement or assessment tests in mathematics, writing, and reading, and that institutions inform the students needing remediation of the responsibility to complete the course work within the first 30 semester hours.

2.02.04 To ensure that each enrolled first-time undergraduate identified as needing basic skills remedial course work is provided with written notification identifying which state institutions offer such basic skills courses, including any electronic on-line courses.

2.03 Institutional Role and Responsibilities

2.03.01 To assess college readiness in mathematics, writing, and reading and ensure that the state-approved tests are administered as needed.

2.03.02 To inform students identified with remedial needs that s/he should complete remediation no later than the end of the freshmen year (i.e., within the first 30 semester hours after being matriculated as a college student). For students with unmet remedial needs who have completed 30 or more credit hours, institutions must require that a student meet with an academic advisor on the need to address basic skill deficiencies before registering for additional course work.

2.03.03 To place students in the appropriate level of course work upon assessment. Students not meeting the specified minimum cut score may be placed in college-level courses and reported as such, provided that a student's transcripts or other secondary-level assessment justifies such placement.

2.03.04 To offer basic skills courses as allowed within statutory role and mission.

2.03.05 To submit remedial data to the Commission.

2.04 Student Responsibilities

2.04.01 To take the required assessment and placement tests, if necessary, prior to or during the first term of enrollment.

2.04.02 To take the appropriate remedial course work no later than the end of their freshman year (i.e., within the first 30 semester hours) if a student is identified as needing remediation.

3.00 Terminology

3.01 **Assessment Tests:** Colorado accepts three assessment instruments for determining if the first-time student is college ready in mathematics, writing, and reading based on the relevant cut scores listed in Attachment B.

3.01.01 ACT:
Math: ACT Assessment mathematics subscore
Writing: ACT Assessment English subscore
Reading: ACT Assessment reading subscore

3.01.02 SAT:
Math: SAT Mathematics
Writing and Reading: SAT Verbal

3.01.03 Accuplacer:
Math: Elementary Algebra
Writing: Sentence Skills
Reading: Reading Comprehension

3.02 **Basic Skills:** Courses that are designed to provide instruction in academic skills or remedial courses that are necessary content preparation for college-level work. By definition, basic skills courses will not count as credit for any academic degree at an institution. Vocational certificates and A.A.S. degrees are excluded from this definition of academic degrees.

3.02.01 **Academic Skills:** Basic skills courses that teach study skills necessary to succeed in college. Examples of such courses include Study Skills, College Survival Skills, Listening and Note Taking, How to Study Your Textbooks, and Memory and Test Taking.

3.02.02 **Remedial Courses:** Basic skills courses designed for students deficient in the academic competencies necessary to succeed in a regular college curriculum, including:

a) Mathematics – Courses that primarily cover concepts introduced in elementary algebra, geometry, and intermediate algebra. The courses focus on word problems that would most likely be solved by arithmetic, knowledge of number systems (e.g., positive and negative numbers, square root, squares, percent, ratio, and conversion of fractions to decimals), simple equations, and finding information from a graph.
b) Writing – Courses that concentrate primarily on grammar, word usage, and punctuation. The courses focus on the student's ability to construct sentences with basic agreement among nouns, verbs, and pronouns in the same phrase, avoid gross errors in simple sentence structures, and logically select and order main ideas in a paragraph using appropriate transition words.
c) Reading – Courses that focus primarily on non-technical vocabulary, word identification, and reading of everyday material. The courses focus on developing the student's ability to recognize and comprehend discrete pieces of information, understand relationships explicitly stated in a paragraph or passage, and comprehend words or phrases in context.

Course work may be delivered through traditional classroom methods or vestibule laboratories. Vestibule labs are supervised by faculty to offer instruction in specifically-identified basic skill deficiencies. Deficiencies may be self-identified by the student or from instructor referral.

3.03 **College level courses:** Courses that apply to the graduation requirements of an academic degree.

3.04 **First-Time Undergraduate:** As applied in this policy, an undergraduate student enrolling in a higher education institution for the first time with no previous postsecondary experience. Enrollment in personal enrichment or avocational courses is not considered previous postsecondary experience. Prior enrollment as a high school student concurrently enrolled in a higher education institution does not preclude a student from being categorized as first-time.

3.04.01 Three groups of students are included in the definition of first-time undergraduate unless exempted below:

3.04.01.01 first-time, degree-seeking undergraduates;
3.04.01.02 non-degree-seeking undergraduates who change to degree-seeking status; and
3.04.01.03 non-degree-seeking first-time undergraduates who have graduated from a Colorado public or private high school (or its equivalent) during the previous academic year.[1]

3.04.02 Students who have completed either a college-level mathematics and college-level writing course or a remedial course (if required) in mathematics, writing, and reading are exempt from assessment. Other students exempt from assessment include those who:

3.04.02.01 earned a baccalaureate degree; or
3.04.02.02 earned a transfer-oriented associate degree (i.e., A.A. or A.S.); excludes A.G.S. and A.A.S. graduates; or
3.04.02.03 are pursuing a vocational certificate. Note that some institutions' assessment requirements may be more stringent than that set by the Commission (e.g., requiring assessment of certificate-seekers); or
3.04.02.04 are a concurrently enrolled high school student until they are matriculated by the institution as a degree-seeking undergraduate by an institution; or
3.04.02.05 are exchange students (students coming from another institution, state, or country for study) for a defined period of time (e.g., academic term or year); or
3.04.02.06 are non-degree-seeking undergraduates (unless recent high school graduates referenced above) until they become degree-seeking.

[1] Pursuant to C.R.S. 23-1-113.3, CCHE must provide a high school feedback report to Colorado school districts on remediation of their recent high school graduates. For that report, recent high school graduates are defined as degree- and non-degree-seeking undergraduates who a) have graduated from a Colorado public or private high school (or its equivalent) during the previous academic year; or b) are 17, 18, or 19 years of age if year of high school graduation is not provided by the higher education institution. Age will be calculated as of September 15 of the specified fiscal year.

4.00 Process and Procedures

4.01 Governing Board Policy Requirements and Format

4.01.01 In order to comply with section 2.02.01 and 2.02.02 of this policy, each governing board shall require its institutions to develop remedial procedures that:

- Specify the test administration policy, including dates and location or test administrator (e.g., contract with another college).
- Specify its practices for informing students regarding the availability of remedial courses, including any electronic on-line courses.
- Specify the practices for determining how the students who are diagnosed as needing remedial courses have satisfied the remedial requirements.

4.02 Funding

4.02.01 Any state-supported institution of higher education with a two-year statutory role and mission may offer and receive state general fund for basic skills courses.

4.02.02 Any state-supported institution of higher education without a two-year role and mission is prohibited from claiming general fund support for basic skill credit hours. However, these institutions may offer basic skills courses by contracting with a Colorado public community college or on a cash-funded basis, except for Metropolitan State College of Denver and the University of Colorado at Denver. Colorado statute states that the Community College of Denver is the only institution on the Auraria campus authorized to deliver basic skills courses – for state support or for cash.

4.02.03 No institution of higher education may include basic skills credit hours generated by postsecondary options (PSEO) or FastTrack students in the number claimed for state general fund support or include students concurrently enrolled in home schooling.

5.00 Accountability and Data Reporting

5.01 Any institution that provides basic skills courses – whether the courses are delivered for cash or receive state support -- shall collect data regarding student performance, including data that describes the students who take basic skills courses, the school districts from which said students graduated, the year in which they graduated, the basic skill areas that required remedial instruction, and the credit hours earned in remedial courses.

5.02 All institutions providing basic skills courses shall submit the required files to the Commission, following its prescribed data definitions and reporting dates.

5.03 The Commission shall transmit annually to the Education Committees of the Senate and the House of Representatives, the Joint Budget Committee, and the Department of Education, an analysis of the data including:

- The number of students who take basic skills courses,
- The costs of providing basic skills courses, and
- Whether students who complete said basic skill courses successfully complete the requirements for graduation.

To determine the students included in the recent high school graduate cohort, the age will be estimated using the date of birth provided by the institution (as of September 15 of the fiscal year being reported) if a student's high school graduation date is not submitted.

5.04 The Commission shall disseminate the analysis to each Colorado school district and the public high schools within each district, complying with CCHE's adopted Privacy Policy.

5.05 The institutions shall provide any financial information, including FTE generated by remedial courses and program costs, following prescribed data definitions and formats.

This table will be monitored annually once Colorado data are collected. Cut scores may be adjusted higher or lower based on empirical data of student performance in college mathematics and college writing courses.

SKILL AREA	ACT Subscore	SAT Subscore	ACCUPLACER Score
Mathematics	Math: 19	Math 460	Elementary Algebra: 85
Writing	English: 18	Verbal 440	Sentence Skills: 95
Reading	Reading: 17	Verbal 430	Reading Comprehension: 80

APPENDIX 3

COLORADO STATUTES
TITLE 23 HIGHER EDUCATION AND VOCATIONAL TRAINING/STATE UNIVERSITIES AND COLLEGES/General and Administrative/ARTICLE 1 COLORADO COMMISSION ON HIGHER EDUCATION/23-1-113.3.
Commission directive -- basic skills courses.

23-1-113.3. Commission directive - basic skills courses.
Statute text
(1) On or before September 1, 2000, the commission shall adopt and the governing boards shall implement standards and procedures whereby basic skills courses, as defined in section 23-1-113 (1) (b) (II) (A.7), may be offered by state institutions of higher education pursuant to this section.
(2) (a) Adams state college, Mesa state college, any local community college, and any community college governed by the state board for community colleges and occupational education may offer basic skills courses, as defined in section 23-1-113 (1) (b) (II) (A.7), and receive stipend payments from the state on behalf of eligible undergraduate students, as defined in section 23-18-102 (5), enrolled in basic skills courses.
(b) Except as otherwise provided in subsection (5) of this section, any state institution of higher education not specified in paragraph (a) of this subsection (2) is prohibited from offering a basic skills course, unless the course is offered by contract through any of the institutions of higher education specified in paragraph (a) of this subsection (2).
(c) Notwithstanding the provisions of paragraph (b) of this subsection (2), Metropolitan state college of Denver and the University of Colorado at Denver are prohibited from offering basic skills courses either directly or through contract with an institution specified in paragraph (a) of this subsection (2).
(3) The state board for community colleges and occupational education, local community colleges, Adams state college, and Mesa state college shall: (a) Track all students who are required to take basic skills courses pursuant to section 23-1-113 (1) (b) (I) (B) in order to determine whether those students successfully complete requirements for graduation;
(b) Compile data regarding student performance that describes with regard to students who take basic skills courses pursuant to section 23-1-113 (1) (b) (I)
(B):
(I) The school districts from which said students graduated;
(II) The number of said students graduating from each school district; and
(III) The basic skills for which said students require remediation; and
(c) Report annually to the commission the data compiled pursuant to paragraphs
(a) and (b) of this subsection (3).
(4) (a) The commission shall transmit annually to the education committees of the senate and the house of representatives, the joint budget committee, and the department of education an analysis of the data:
(I) Regarding students who take basic skills courses pursuant to section 23-1-113 (1) (b) (I) (B); and
(II) Regarding the costs of providing basic skills courses pursuant to section 23-1-113 (1) (b) (I) (B) and whether students who complete said basic skills courses successfully complete the requirements for graduation.
(b) The commission shall disseminate the analysis to each school district and to public high schools within each district.
(5) Any state institution of higher education not specified in paragraph (a) of subsection (2) of this section offering a basic skills course on a cash-funded basis shall report annually to the commission the same data that is required to be compiled and reported pursuant to paragraphs (a) and (b) of subsection (3) of this section.
(6) For purposes of this section, "local community college" shall include Aims Community College, Colorado Mountain College, Northeastern Junior College, and Colorado Northwestern Community College.

COLORADO COMMUNITY COLLEGE SYSTEM
REPORT ON REMEDIAL EDUCATION

History
Source: L. 2000: Entire section added, p. 1482, § 1, effective June 1. L. 2002: (1) and (2)(a) amended, p. 1021, § 37, effective June 1. L. 2004: (2)(a) amended, p. 718, § 5, effective July 1, 2005. L. 2005: (2)(a) amended, p. 1014, § 5, effective July 1, 2006.
Annotations
Cross references: For the legislative findings and declarations contained in the 2004 act amending subsection (2)(a), see section 1 of chapter 215, Session Laws of Colorado 2004.

APPENDIX 4

Summary of Boylan's Research-Validated Best Practices

- The establishment of clearly specified goals and objectives for developmental programs and courses.
- The use of mastery learning techniques in remedial courses.
- The provision of a high degree of structure in remedial courses.
- The use of a variety of approaches and methods in remedial instruction.
- The application of sound cognitive theory in the design and delivery of remedial courses.
- The provision of a centralized or highly coordinated remedial program.
- The use of formative evaluation to guide program development and improvement.
- The establishment of a strong philosophy of learning to develop program goals and objectives and to deliver program services.
- The implementation of mandatory assessment and placement.
- The provision of a counseling component integrated into the structure of remedial education.
- The provision of tutoring performed by well-trained tutors.
- The integration of classroom and laboratory activities.
- The establishment of an institution-wide commitment to remediation.
- The assurance of consistency between exit standards for remedial courses and entry standards for the regular curriculum.
- The use of learning communities in remedial instruction.
- The use of Supplemental Instruction, particularly video-based Supplemental Instruction to support remedial courses.
- The provision of courses or workshops on strategic thinking.
- The provision of staff training and professional development for those who work with under prepared students.
- The provision of ongoing student orientation courses.
- The integration of critical thinking into the remedial curriculum.