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## ABSTRACT

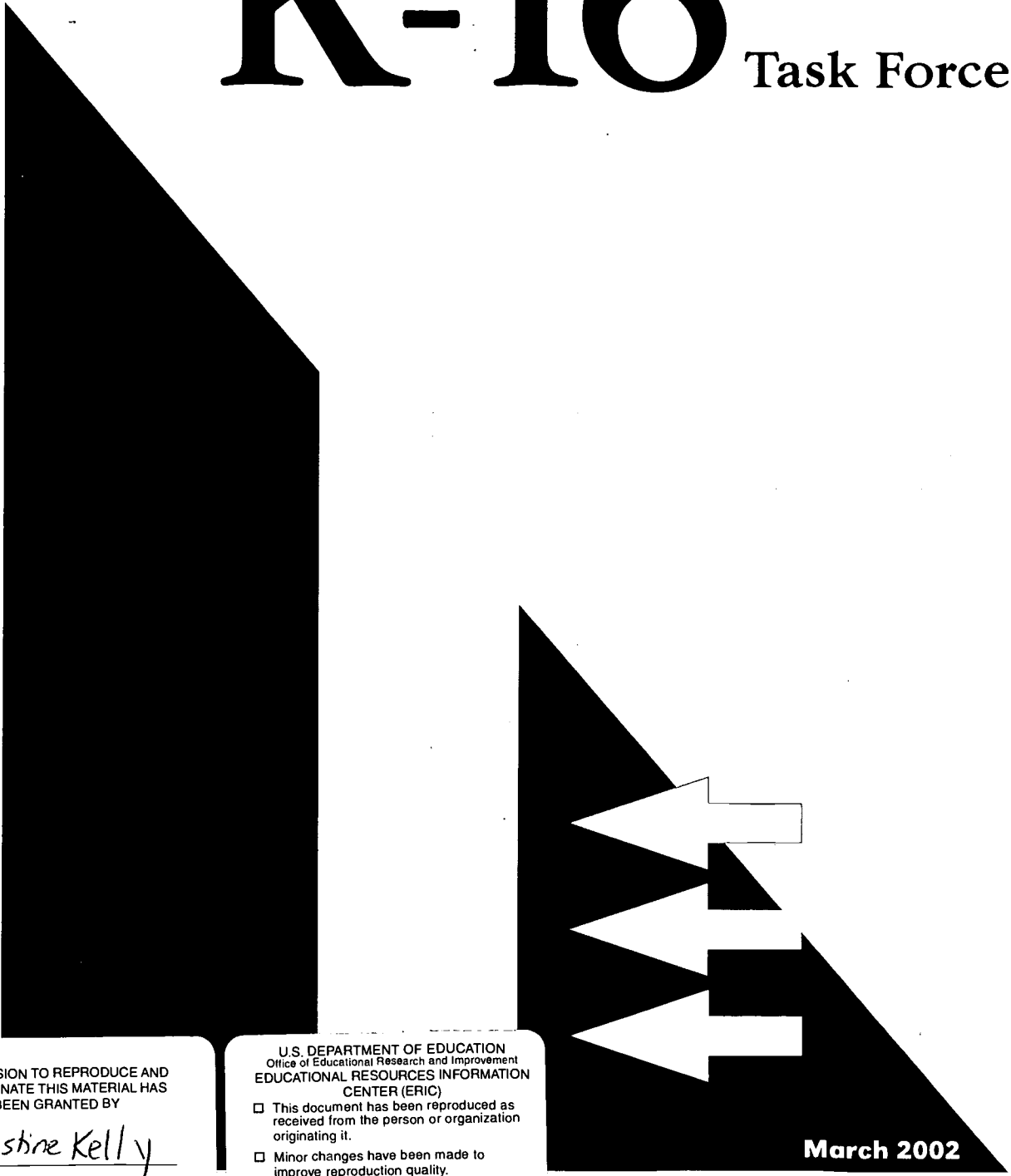
In 2001, Missouri's K-16 project launched the K-12 Task Force on Achievement Gap Elimination, which believes that improving teacher quality is the single most important factor in eliminating the achievement gap among Missouri students. This report describes the significance of teacher quality on student achievement, emphasizing the uneven distribution of high-quality teachers throughout the state. While Missouri's students are not well prepared to take full advantage of the state's higher education opportunities, some are at greater disadvantage than others. The report describes Missouri in a national context; defines "achievement gap"; presents individual and statewide consequences of achievement gaps; and discusses teacher quality as a factor in achievement gaps. Recommendations include: design a financial incentive of at least \$10,000 annually per teacher to attract and retain the highest-quality new and continuing teachers at low-performing schools; establish standards for the quality of teaching in a building and the quality of building leadership in a district; assess teachers' content knowledge in low-performing schools and provide content-based professional development for those with deficiencies; and develop a coordinated K-16 data collection process for analyzing student performance. Tables are appended. (SM)

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# Achievement Gap Elimination

Report of the Missouri

# K-16 Task Force



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March 2002

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**Contents**

Foreword .....5

Executive Summary.....7

The Issue:  
Achievement Gaps .....9

Missouri in a  
National Context..... 11

Defining  
"Achievement Gap" ..... 15

Consequences of  
Achievement Gaps ..... 23

Teacher Quality as a Factor  
in Achievement Gaps..... 25

Recommendations..... 29

Conclusion .....41

Appendices ..... 43

## Foreword

In a democratic society, the circumstances surrounding birth should not determine an individual's educational privilege. After more than two hundred years of public education in America, wide gaps in educational opportunity persist for many school children living in inner cities, those living in poverty, and those who are members of minority groups. Missouri formed a K-16 Coalition in 1997 to promote high standards and smooth transitions for all students. The Coordinating Board for Higher Education (CBHE), the State Board of Education (SBE), and the University of Missouri Board of Curators (UM) are cosponsors of this collaborative, statewide initiative. The work of Missouri's K-16 Coalition builds on the state's long-standing interest in teacher quality and its effect on student achievement.

Missouri's first formal K-16 project, directed by Dr. Melvin George, resulted in the publication of *Mathematics in Missouri* in December 1999. This report identified enhancing teacher quality as one of several important strategies for improving mathematics learning in Missouri schools. The report also reinforced the continued use of performance funding incentives to support high entrance and exit standards for teacher education programs.

In February 2001, Missouri's K-16 cosponsors launched another major initiative by appointing a K-16 Task Force on Achievement Gap Elimination (K-16-TAGE). Under the leadership of Dr. Charles J. McClain, former Missouri Commissioner of Higher Education, prominent Missouri citizens agreed to work collaboratively in the design of recommendations to be submitted to each K-16 sponsoring board. K-16-TAGE was charged with reviewing issues, studying best practices, and making public its recommendations about ways to improve student academic achievement at all levels. K-16-TAGE members were also charged with identifying performance indicators that could be used to monitor, and provide incentives for, improving teacher quality. Early in the process, a Request for

Information (RFI) was distributed widely to Missouri educational organizations and institutions, inviting briefing papers and reports. The RFI targeted teacher and principal quality, professional development, alternative certification, curriculum and assessment alignment, and characteristics of high- and low-performing schools as topics of interest to K-16-TAGE. Reports and papers submitted in response to the RFI were used to inform the work of the K-16-TAGE.

K-16-TAGE members genuinely believe that eliminating achievement gaps in the performance of Missouri's students is an ethical imperative that must be addressed. Enhancing teacher quality is identified as the most important strategy for improving student achievement. Underlying all of the K-16-TAGE's recommendations and strategies is the belief in the value of local autonomy in Missouri's system of public education. Each school district and each postsecondary institution sets policies and establishes practices within the boundaries of state laws and regulations governing education. Local leaders are uniquely situated to determine what works best for local teachers and students. The diversity of policies and practices throughout the state presents certain challenges to the boards that oversee education in Missouri. The boards must be prepared to address these challenges in order to have all Missouri educators working together toward a common goal of eliminating the achievement gaps among Missouri students.

## Executive Summary

School children around the country begin each day by reciting the Pledge of Allegiance, ending with the words "and justice for all." But by many measures, our nation's system of public education fails to deliver on this promise of equity. Today, where a student lives is a strong predictor of the opportunity he or she has to attain the highest levels of academic achievement and accomplishment. Students in urban school districts, many of whom are members of minority groups and/or from low-income families, have the fewest opportunities for academic success. They perform less well on standardized tests, they graduate from high school at a lower rate than their peers in more affluent areas, they are less prepared for college, and they are less likely to pursue postsecondary education. While concentrated in urban areas, low-performing schools also exist in some rural areas. The achievement gaps between students in low-performing schools and students in more privileged school districts are large, they are measurable, and they are not shrinking on their own.

The K-16-TAGE believes that improving teacher quality is the single most important factor in eliminating the achievement gaps among Missouri students. Numerous factors contribute to low student achievement, whether in urban or rural school districts, and many of these factors are beyond a school district's control. Despite the range of challenges faced by low-performing school districts, teacher quality is one factor a district *can* control through its hiring, mentoring, and professional development practices.

The responsibility for improving teacher quality does not rest solely on the school district. Instead, the K-16-TAGE recommends a concerted effort on the part of school districts, colleges and universities that prepare teachers, state

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regulatory and leadership departments, and Missouri citizens in order for Missouri to eliminate the achievement gaps among its students. Failure to eliminate these gaps will jeopardize the economic future of large numbers of Missouri citizens as well as reduce Missouri's opportunities for continued economic growth and development.

As a result of extensive review and deliberation, the K-16-TAGE presents the following primary and secondary recommendations.

### Primary Recommendations

- Design a financial incentive of at least \$10,000 annually per teacher to attract the highest-quality new and continuing teachers to low-performing schools and retain them at these schools.
- Hold teacher preparation programs that admit underprepared students accountable for the performance of their graduates and implement new teacher certification policies for graduates of out-of-state institutions.
- Establish standards for the quality of teaching in a building and the quality of building leadership in a district.
- Assess the content knowledge of teachers in low-performing schools and provide content-based professional development for those with deficiencies.
- Implement an effective accountability system for Regional Professional Development Centers (RPDCs).
- Design teacher education programs to increase understanding of urban education.

***"Improving teacher quality is the single most important factor in eliminating the achievement gaps among Missouri students."***

**Secondary Recommendations**

- Develop a coordinated K–16 data collection process for analyzing student performance.
- Use the results of research to align teacher education programs and certification requirements and to enhance the state’s ability to evaluate teacher education programs.
- Reward professional development with higher pay on school district salary schedules when professional development is directly relevant to an individual’s school district position.
- Design fast-track teacher certification programs that target quality mid-career and retired professionals for recruitment into the teaching profession.
- Develop a statewide, competency-based, articulated teacher education curriculum for the first two years of college.
- Increase public recognition and prestige of leaders of schools or school districts that make significant academic improvements.

## The Issue: Achievement Gaps

Both nationally and within Missouri, geographical location, socioeconomic status, and race are correlated with differences in educational opportunities and student achievement. Achievement gaps in Missouri are most prevalent among schools with large concentrations of poor and minority students. Missouri's urban schools are particularly challenged since they have high proportions of low-income and minority students. A systematic analysis of several indicators reveals significant achievement gaps in student performance for selected schools, suggesting that Missouri's educational system has failed large numbers of its citizens. These achievement gaps include:

- lower performance on Missouri Assessment Program (MAP) tests at all grade levels and in all subject areas;
- lower rates of college admissions testing;
- lower scores on the ACT;
- less preparation for collegiate-level work;
- lower high school graduation rates;
- lower college attendance rates; and
- a greater need for remediation in college.

The achievement gaps within Missouri are of particular concern. There is little doubt that Missouri students at or near the bottom of the spectrum are at a disadvantage. Not only are these students failing educationally, they are much more likely to fall behind economically given the strong correlation between educational background and earning potential. The consequences of these achievement gaps extend far beyond the individual. Lower individual earnings translate into reduced state income tax and lower sales tax revenues. Fewer highly educated workers will make Missouri less attractive to new business and will ensure Missouri's depen-

***"A systematic analysis of several indicators reveals significant achievement gaps in student performance for selected schools, suggesting that Missouri's educational system has failed large numbers of its citizens."***

dence on imported talent for high-growth, high-salary industries such as life sciences, information technology, and advanced manufacturing.

Although achievement gaps are often concentrated among urban school districts with high proportions of low-income minority youth, it is important to note that there is not a causal relationship between a school's location and achievement or student demographics and achievement. A recent national report identified over 4,500 high-poverty and high-minority schools that performed in the top one-third of all schools in their states — often outperforming predominantly white schools in wealthy communities.<sup>1</sup> If this level of achievement is possible, we must ask why so many poor and minority students fall far below average on so many state and national assessments. According to Katy Haycock, director of the Educational Trust,

[M]uch of the underachievement that we have historically blamed on poverty or family circumstances is instead attributable to what we have done — systematically assigned these children disproportionately to large numbers of our weakest teachers.<sup>2</sup>

This report describes the significance of teacher quality on student achievement, with particular emphasis on the uneven distribution of high-quality teachers throughout the state. Throughout this report, a "low-performing school" is defined as a school that meets the criteria for a "concerned school," as set forth by the

1 *Dispelling the Myth Revisited*. Available at [www.edtrust.org](http://www.edtrust.org).

2 "Poorest Kids Often Wind Up with the Weakest Teachers." *Chicago Sun-Times*, September 7, 2001.



## **The Issue: Achievement Gaps**

Department of Elementary and Secondary Education.<sup>3</sup> The primary and secondary recommendations at the end of this report suggest strategies for improving the quality of the teaching workforce in Missouri's low-performing schools as a means of eliminating achievement gaps.

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<sup>3</sup> See <http://www.dese.state.mo.us/schoallow/rulesregs/30340010.htm>. A "concerned school" is one in a district where the average graduation rate is at least one standard deviation below the statewide mean. Within these districts, a concerned school is one in which 15 percent or more of the students score at the lowest two levels of the MAP tests.

## Missouri in a National Context

By any number of measures, the health of a state's economy shows a high correlation with the quality of its educational system. In its report, *Measuring Up 2000: The State by State Report Card for Higher Education*,<sup>4</sup> the National Center for Public Policy and Higher Education awarded letter grades to states on the basis of five critical measures of the strength of their higher education system. Five states scored a D or F on three or more of these measures (Appendix A). The three states with the lowest overall grades also ranked near the bottom in key measures of their economy (Table 1). In contrast, the three states with the highest overall grades ranked near the top on these same economic indicators (Table 1

and Appendix A). These data suggest that a state concerned about its economic future should look carefully at the strength of its educational system.

**Table 1.**  
**Relationship Between *Measuring Up* Grades and State Economic Indicators**

A. Three Lowest-Performing States with Comparison to Missouri

State	GPA <sup>5</sup>	Per Capita Income Rank (2000) <sup>6</sup>	Percent of People Under Age 18 in Poverty (1998) <sup>7</sup>
Louisiana	1.0	46	25.7
West Virginia	1.2	50	24.2
Arkansas	1.2	48	25.0
Missouri	2.0	30	16.8

B. Three Highest-Performing States with Comparison to Missouri

State	GPA	Per Capita Income Rank (2000)	Percent of People Under Age 18 in Poverty (1998)
Connecticut	3.4	1	13.3
Illinois	3.4	11	15.4
New Jersey	3.4	4	13.2
Missouri	2.0	30	16.8

4 National Center for Public Policy and Higher Education. *Measuring Up 2000: The State by State Report Card for Higher Education*. Washington, D.C. 2000.

5 Average of five grades as reported by the National Center for Public Policy and Higher Education. *Measuring Up 2000: The State by State Report Card for Higher Education*. Washington, D.C. 2000, pp. 18-22.

6 2000 data as reported by the Bureau of Economic Analysis (<http://www.bea.dac.gov/bea/regional/bearfacts/>).

7 U.S. Census Bureau, Small Area Income and Poverty Estimates Program (<http://www.census.gov/hhes/www/>).

**Missouri's Performance**

Although Missouri received passing grades in *Measuring Up 2000*, the state's higher educational system is far from honor-roll quality. Two of the five indicators measured in the report directly address the interface between the K-12 and higher education systems. Missouri received average to low marks in preparation for (C+), and participation in (C-), higher education. Several factors were considered in assigning grades to each of these categories. Traditional indicators of preparation

and participation place Missouri significantly lower than the top five states in the nation (Table 2).

**The Challenges of Missouri's Urban School Districts**

The quality of Missouri's educational system has a strong impact on the strength of its economy. Although not ranked near the top or the bottom on the key measures rated by *Measuring Up*, Missouri has a long way to go to reach its economic potential. Missouri faces a number of challenges as it attempts to bring all students up to standard. Missouri's urban school districts have significantly higher percentages of minority students, compared to the state as a whole.<sup>8</sup> Likewise, a larger percentage of students in urban districts participate in Free and Reduced Lunch (FRL) (Figure 1).

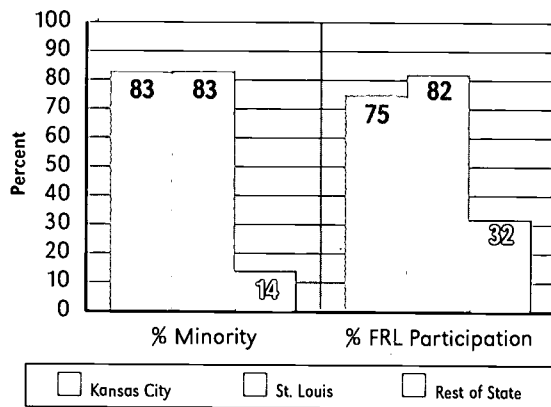
**Table 2.**  
**Comparison of Missouri to Top Five States in Preparation for, and Participation in, Higher Education**

Preparation (C+)	Missouri	Top Five States
18- to 24-Year-Olds with High School Credentials	90%	93%
High School Students Taking Upper-Level Math	49%	59%
High School Students Taking Upper-Level Science	31%	37%
8th Grade Students Taking Algebra	19%	28%
Low-Income 8th Graders Scoring at or above "Proficient" on the National Assessment of Educational Progress Math Exam	9%	19%

Participation (C-)	Missouri	Top Five States
High School Freshmen Enrolling in College Within 4 Years	36%	54%
18- to 24-Year-Olds Enrolling in College	30%	42%

**Figure 1.**  
**Characteristics of Missouri's Largest Urban School Districts**



**Source:** Department of Elementary and Secondary Education (DESE) Core Data, 1999-2000  
The average percent minority students (left) and average percent students participating in Free and Reduced Lunch (FRL) are shown for the Kansas City Missouri School District (KCMSD), the St. Louis Public Schools, and for all other school districts in the state.

<sup>8</sup> African-Americans are the largest minority group, representing 80 percent of the school population in St. Louis, 72 percent of the school population in Kansas City, and 11.5 percent of the school population elsewhere in the state.

Across the United States, poverty and minority status have long been correlated with lower school performance, and Missouri school districts follow a similar pattern. The Kansas City and St. Louis School Districts have minority populations and poverty rates much higher than the statewide average (Figure 1). Although there are a number of high-achieving school buildings with high percentages of minority and/or low-income students in these urban areas, a majority of students in the Kansas City and St. Louis areas still face barriers to a quality education. The Kansas City Missouri School District (KCMSD) lost its accreditation in October 1999, and the St. Louis City School District currently has only provisional accreditation.

In FY 2001, the Missouri Department of Elementary and Secondary Education (DESE) implemented a process for identifying "concerned schools" and determining if those school buildings should be declared "academically deficient."<sup>9</sup> Implementation of DESE's policies on "concerned schools" and "academically deficient schools" began with the KCMSD, which volunteered to be the first school district to participate in this process. By administrative rule (5 CSR 30-340.010), no more than five schools in any one school district can be declared "academically deficient" in any given year. In FY 2001, five school buildings in KCMSD were identified as "concerned schools," and based on the findings of an audit team review, the State Board of Education declared those buildings to be "academically deficient." During the second year of implementation, DESE identified an additional 15 "concerned schools." Currently, five of these "concerned schools" are in the St. Louis City School District, nine are in the surrounding St. Louis Metropolitan Area, and one is in southeastern Missouri. All of these "concerned schools" are currently

***"Across the United States, poverty and minority status have long been correlated with lower school performance, and Missouri school districts follow a similar pattern."***

undergoing a team audit to determine if they should be declared "academically deficient." Although the administrative rule permits an audit of the lowest 50 "concerned schools" for determination of "academically deficient" status, DESE has restricted the number of schools identified as "concerned schools" based on resources available and its commitment to provide technical and financial assistance to the most needy school buildings throughout the state. As currently implemented, the combined total of "concerned schools" and "academically deficient schools" in a school district will not exceed five in any given year. Therefore, official lists of such schools do not adequately capture the depth of the challenges facing KCMSD, the St. Louis City School District, and other areas of the state with large numbers of low-performing schools.

<sup>9</sup> See note 3 for statutory definition of a "concerned school." In order to be declared "academically deficient," a school must first be identified as a "concerned school" and then undergo a team audit, which includes a recommendation to the State Board of Education regarding the school's status.

## Defining "Achievement Gap"

**"The achievement gaps among Missouri's students must be identified, understood, and addressed in order to position the state for economic growth, full utilization of its human potential, and prosperity in the coming decades."**

While Missouri's students are not well prepared to take full advantage of the state's higher education opportunities, some students are at a greater disadvantage than others. Disadvantages that begin in the preschool years often continue throughout a student's educational career. Large numbers of minority students and/or those in lower socioeconomic groups perform poorly on MAP tests. By the time students reach high school, the gaps have broadened to include not only MAP scores but also ACT scores and participation, high school graduation rates, and completion of the state's high school core curriculum. Performance gaps are also reflected in college attendance rates and enrollment in remedial college courses. While performance gaps are associated with minority and low socioeconomic (SES) status, Missouri does have some high-minority, high-poverty schools that are also high performing. Taken as a whole, the achievement gaps among Missouri's students must be identified, understood, and addressed in order to position the state for economic growth, full utilization of its human potential, and prosperity in the coming decades.

### MAP Scores

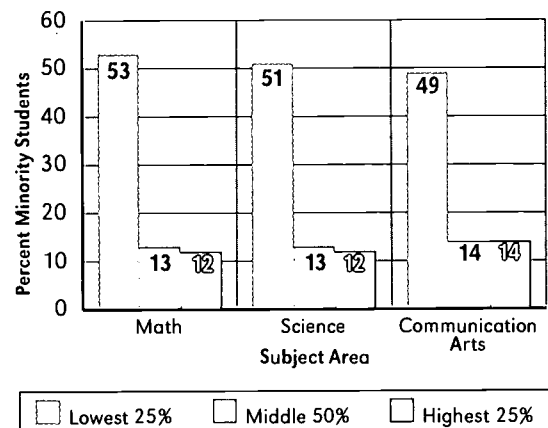
MAP tests are given in mathematics, science, social studies, and communication arts. Depending on the subject area, K-12 students take these tests three times throughout their elementary and secondary years — in grades 3 or 4, 7 or 8, and 10 or 11. Of these four subject areas, the social studies test — required for the first time in 2000 — is the newest addition.

The gaps in MAP scores among Missouri's students begin in the early grades and persist as students move through the

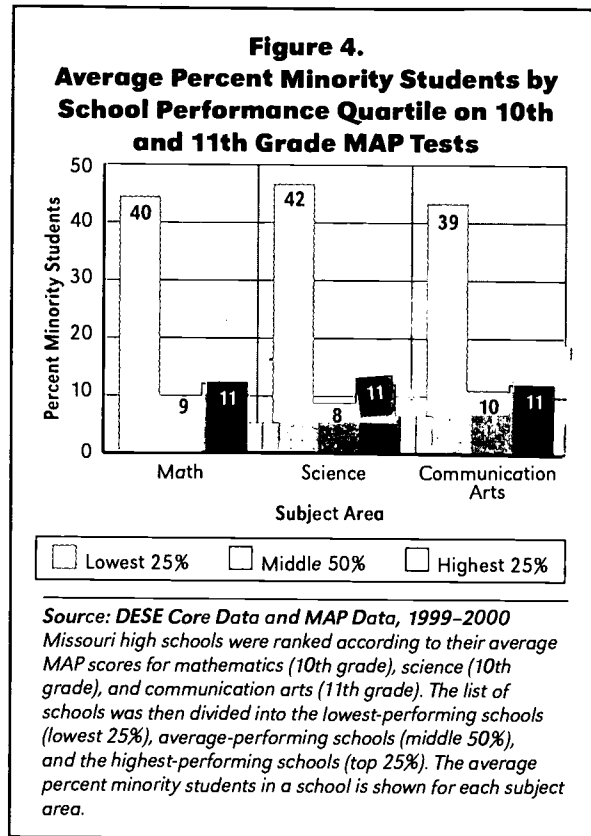
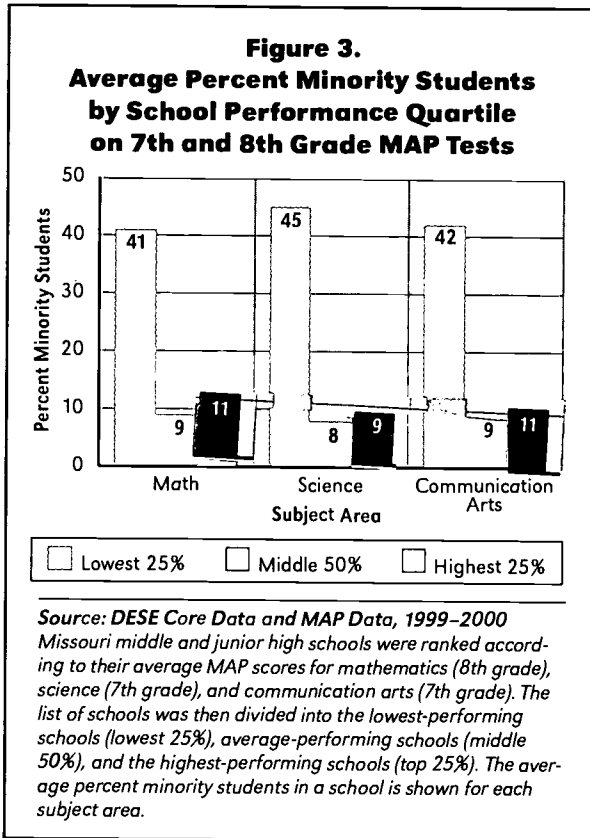
K-12 system. Below-average academic performance correlates with membership in a minority group. Figures 2-4, based on 1999-2000 data, illustrate this pattern. Figure 2 shows that at the elementary level, schools ranked in the bottom quartile on the MAP tests have significantly higher percentages of minority students. Similar results may be found in Figure 3 (7th and 8th grades) and Figure 4 (10th and 11th grades).

When the MAP scores are disaggregated by ethnic group, different patterns emerge (Appendix B). The percent African-Americans by school performance is very similar to the results in Figures 2-4, primarily because African-Americans are Missouri's largest ethnic group. Schools with larger numbers of Hispanic students tend to be clustered in the lower quartile on MAP tests, although their numbers are so low

**Figure 2.**  
**Average Percent Minority Students by School Performance Quartile on 3rd and 4th Grade MAP Tests**



*Source: DESE Core Data and MAP Data, 1999-2000*  
Missouri elementary schools were ranked according to their average MAP scores for mathematics (4th grade), science (3rd grade), and communication arts (3rd grade). The list of schools was then divided into the lowest-performing schools (lowest 25%), average-performing schools (middle 50%), and the highest-performing schools (top 25%). The average percent minority students in a school is shown for each subject area.



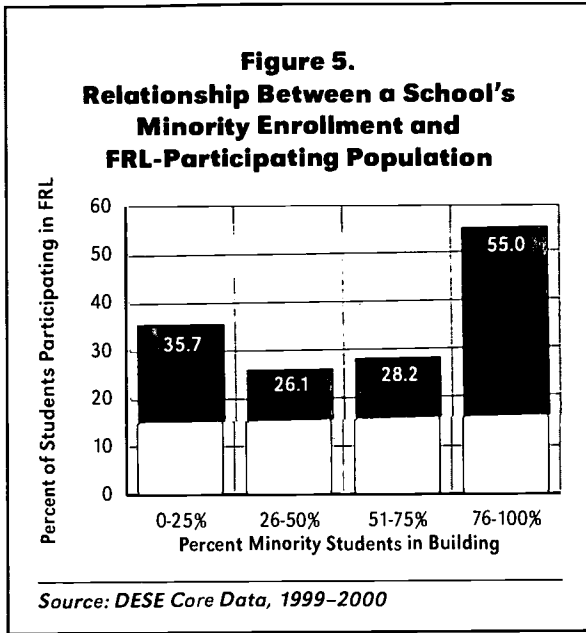
that meaningful conclusions should not be drawn from the data. Asian students also enroll in Missouri's public schools in such low numbers that little can be concluded about school performance on MAP tests.

The data in Figures 2-4 mask the widening achievement gaps as students move through the educational system. As students move from elementary to middle to high school, it appears as if there is less of a relationship between achievement and minority status. However, the unit of analysis in Figures 2-4 is the school building, not the individual student. Elementary schools tend to have a small, neighborhood-based enrollment, and those in high-minority neighborhoods will therefore have high percentages of minority students. In contrast, middle schools, junior high schools, and high schools draw students from a wider

geographic area, thereby reducing the concentration of minority students in many school buildings. For example, 16 percent of Missouri's elementary schools have more than 50 percent minority students, while only 7 percent of high schools do so. In spite of the different demographics of middle schools and high schools compared to that of elementary schools, the percent of minority students in the lowest-performing schools remains significantly higher than that of the middle 50 percent or the upper 25 percent of schools, regardless of grade level or content area.

Figures 2-4 demonstrate that low-performing schools tend to have higher percentages of minority students than do high-performing schools. Low student achievement is also associated with the SES of students in the school (e.g., family income, parents' education,<sup>10</sup> and occupation), in part because there is a correlation between

<sup>10</sup> Phillips, M. et al. (1998). "Family Background, Parenting Practices, and the Black-White Test Score Gap." In Jencks and Phillips, eds. *The Black-White Test Score Gap*. Washington, DC: Brookings Institution.

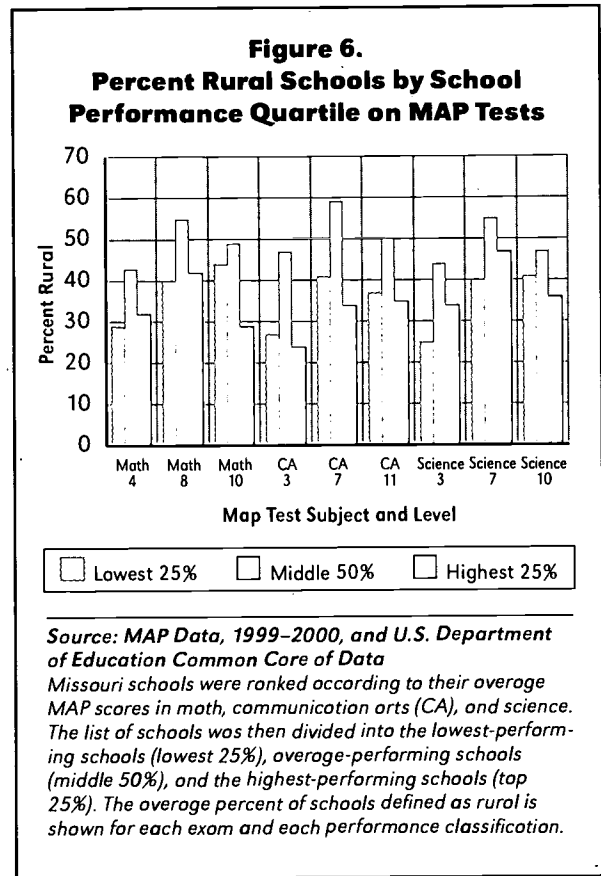


minority enrollment and the percent of students in a school who participate in FRL (Figure 5).

However, school districts do not collect comprehensive data on a student's SES. The closest data available are the percent of students who participate in FRL. This is more weakly correlated with student achievement, especially at the middle school and high school levels, because the data are self-reported and because there is an overall reduced participation rate in the upper grades relative to the number of students who participate in FRL (Appendix C). Despite the weaker correlation, the trends in the data are very similar to the trends in percent of minority data.

**Achievement Gaps in Rural School Districts**

Much of the discussion about achievement gaps has been focused on low-performing schools that also have large concentrations of poor and minority students (Figures 2-4). Notably, Figures 2-4 do not discriminate on the basis of geography; they include all Missouri schools, regardless of



location. Although many of Missouri's low-performing schools are located in urban areas, certain rural areas<sup>11</sup> of Missouri have percentages of minority students and percentages of students participating in FRL that are similar to those of the largest urban school districts. Of schools in the middle 50 percent in terms of performance, between 40 percent and 60 percent are defined as rural — a statistic that suggests that simply being located in a rural area is well correlated with overall school performance on MAP tests. It is important to note that low performance is not restricted to urban schools, as there are significant percentages of rural schools in the lowest quartile of MAP performance in three key subject areas (Figure 6). This report will present data suggesting that student achievement in low-performing

11 This report defines a rural school as one which is located in a community classified as "small town," "rural non-metro," or "rural metro" in the National Center for Education Statistics' Common Core of Data (see <http://nces.ed.gov/ccd/>).

**Defining "Achievement Gap"**

schools is strongly influenced by teacher quality rather than by student characteristics or school location.

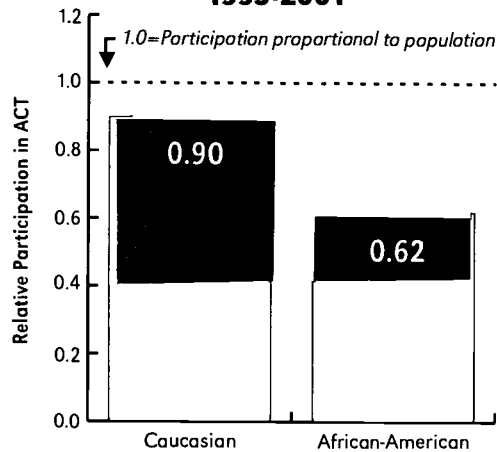
**ACT Participation and Scores**

ACT test-taking patterns and scores are other indications of an achievement gap among students at the end of their high school careers and represent students' preparation for, and intention to apply to, college. The achievement gaps between some ethnic groups are difficult to quantify because the numbers of ACT test-takers identifying themselves as Hispanic, Asian, or Native American are very low compared to the numbers

of Caucasian or African-American test-takers. In addition, large numbers of ACT test-takers identify themselves as biracial or "other," and many do not identify their ethnicity. More importantly, the ACT does not collect data on a student's SES, and as pointed out earlier, there is a strong correlation between SES and school performance. Despite problems with the data, certain achievement gaps are measurable and must be addressed in order to provide all Missourians with the opportunity to succeed. If there were no achievement gaps, participation in the ACT would be in proportion to an ethnic group's representation in the graduating class, as indicated by the dotted line at 1.00 in Figure 7. However, Figure 7 shows that the relative participation<sup>12</sup> in the ACT by African-American students is significantly below that of Caucasian students.

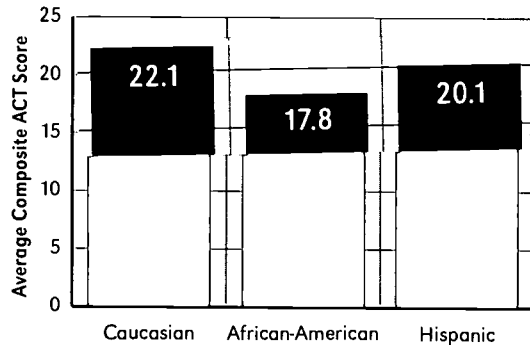
In addition to the ACT test-taking gap between Caucasian and African-American students (Figure 7), there are also large gaps in performance on the ACT by members of different ethnic groups (Figure 8).<sup>13</sup>

**Figure 7.  
Relative ACT Participation Between  
Caucasian and African-American  
Public High School Graduates,  
1995-2001**



**Source: DESE Core Data and ACT Data**  
The numbers of public school students identifying themselves as Caucasian or African-American on the ACT in a given school year were divided by the total number of students who took the ACT that year. Similarly, the numbers of public high school graduates belonging to each ethnic group were divided by the total number of public high school graduates each year. The former term was divided by the latter term to calculate relative participation. These results were averaged over six school years to obtain the results shown.

**Figure 8.  
Average Composite ACT Scores for  
Missouri Public School Students by  
Ethnic Group, 1995-2001**



**Source: ACT Data**  
The composite ACT scores of self-identified Caucasian, African-American, and Hispanic students were averaged over six academic years.

12 Relative participation is defined as the percent of ACT test-takers belonging to a certain ethnic group divided by the percent of high school graduates in a given year who are members of that same ethnic group.

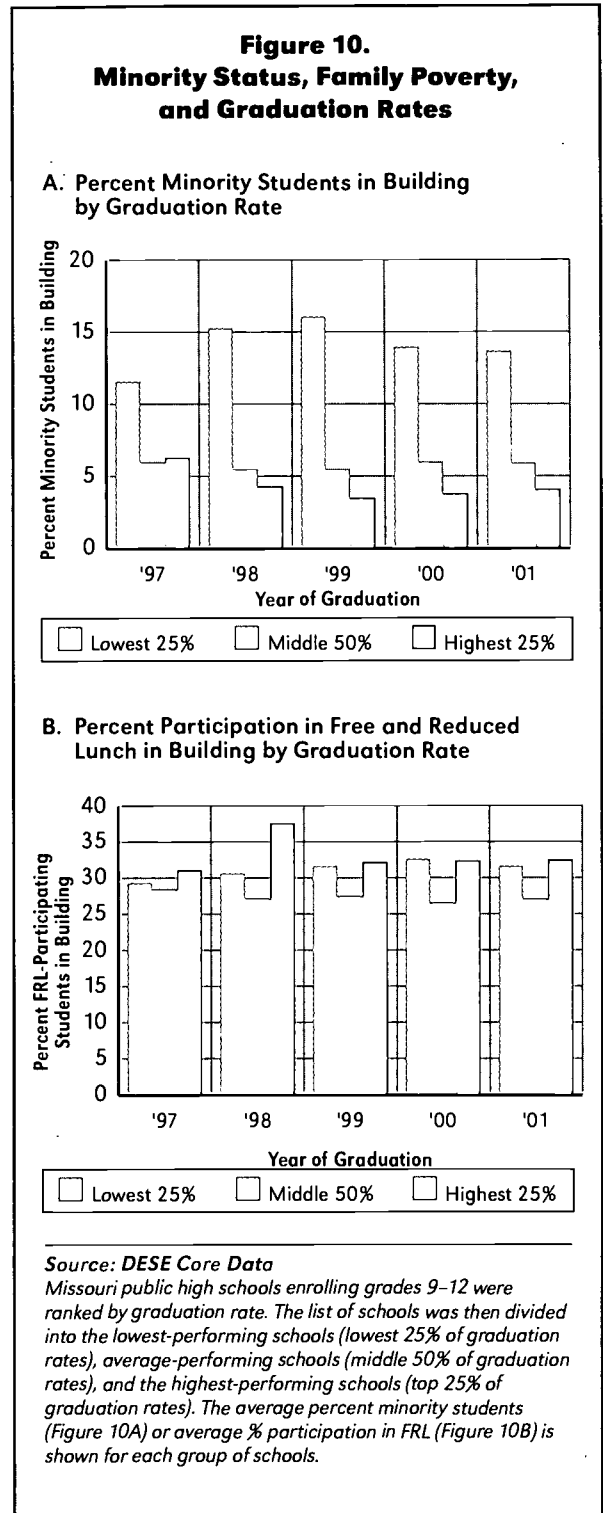
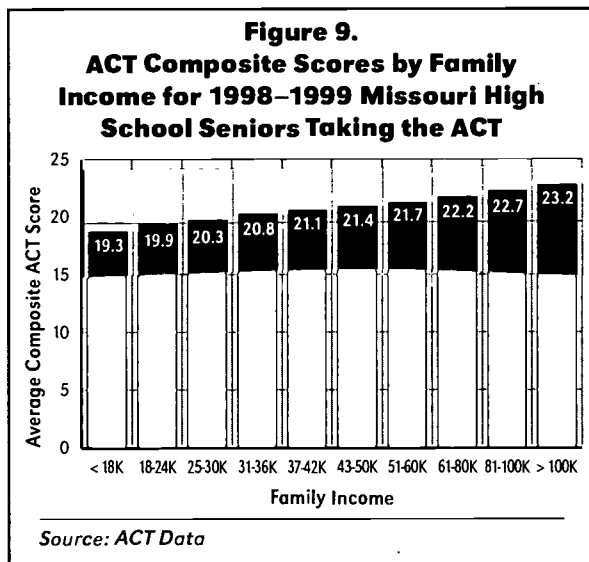
13 Average scores of all students who identified themselves as belonging to one of these three ethnic groups. Caucasian, N = 145,115; African-American, N = 14,294; Hispanic, N = 1,481.



Although a 4.3-point gap in ACT scores may appear insignificant, it can mean the difference between acceptance and rejection at a college with traditional admissions requirements. More importantly, the score reflects the academic skills of the student. A student with a math ACT score of 22.0 is able to solve routine two-step or three-step arithmetic problems such as "percent off" or "tax added," while a student who receives a math ACT score of 17.8 is unable to do so.<sup>14</sup> ACT scores are also strongly associated with family income (Figure 9).

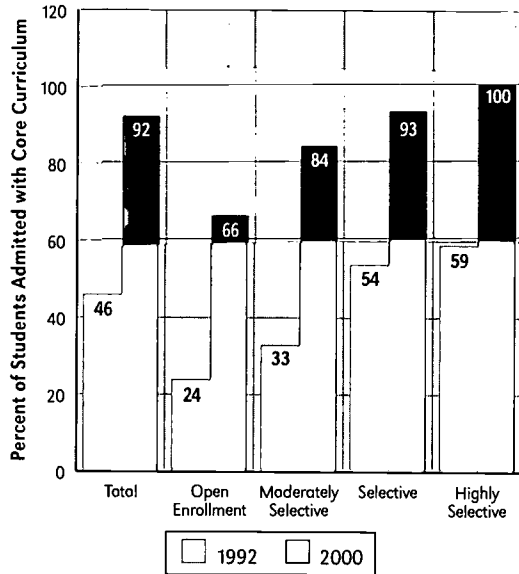
**High School Graduation Rates**

High school graduation rates are affected by the minority status, but not the poverty status, of students in a school. High schools with the lowest graduation rates tend to have the highest percentages of minority students (Figure 10A). However, poverty, as measured by FRL participation of a school's students, is not a very good predictor of a high school's graduation rate (Figure 10B).



14 Data obtained from ACT charts describing what students who score in specified score ranges are likely to know and be able to do.

**Figure 11.**  
**CBHE High School Core Curriculum**  
**Completion by Students at Missouri's**  
**Public Four-Year Colleges and**  
**Universities**



**Source: CBHE EMSAS Data**  
 The average percent of admitted first-time, full-time degree-seeking freshmen at Missouri's public colleges and universities is shown for Missouri's two open-enrollment institutions, five moderately selective institutions, five selective institutions, and one highly selective institution.

paratory Studies Certificate. CBHE data on completion of the high school core curriculum, while providing some insight into college preparation, are limited to students entering Missouri's public four-year institutions. As illustrated in Figure 11, between 1992 and 2000, Missouri doubled the percent of first-time, full-time, degree-seeking freshmen admitted to public four-year institutions who completed the CBHE high school core curriculum. Despite these gains, differences continue to exist based on an institution's admissions selectivity. Students at moderately selective, selective, and highly selective institutions are much more likely to have completed the core curriculum than students at open-enrollment institutions (Figure 11).

The data needed to track variations between high schools, including the extent to which their students graduate with the core curriculum, were not available. The K-16-TAGE strongly encourages DESE and the CBHE to collaborate more fully so that these analyses can be performed.

**College Attendance Rates**

In contrast to high school graduation rates, poverty, rather than minority status, is better correlated with college attendance. When Missouri high schools are grouped according to the rate at which their graduates attend college, there are only modest differences in the average percent of minority students in schools in the three groups (Figure 12A). However, the gap in the college-attending rate is significant for low-income students. The poverty rate, as measured by FRL participation, is 12 to 17 percentage points higher for students in the lowest college attendance group compared to those in the highest group (Figure 12B).

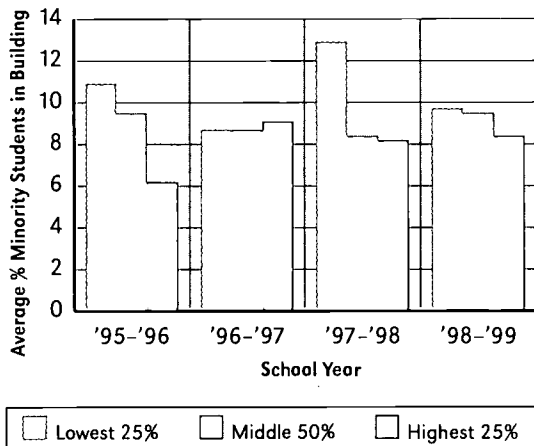
**Preparation for College**

As a group, Missouri students receive only average grades in preparation for college (Table 2). Gaps in preparation for college among groups *within* the state are more difficult to measure. DESE awards a College Preparatory Studies Certificate to high school graduates who meet a rigorous set of eligibility requirements.<sup>15</sup> While members of the K-16-TAGE wanted to explore the characteristics of the high schools that award these certificates to a high percentage of their graduating seniors, the unavailability of data precluded this analysis. Another measurement of preparation for college is completion of the CBHE's 16-unit high school core curriculum,<sup>16</sup> which is aligned with DESE's College Pre-

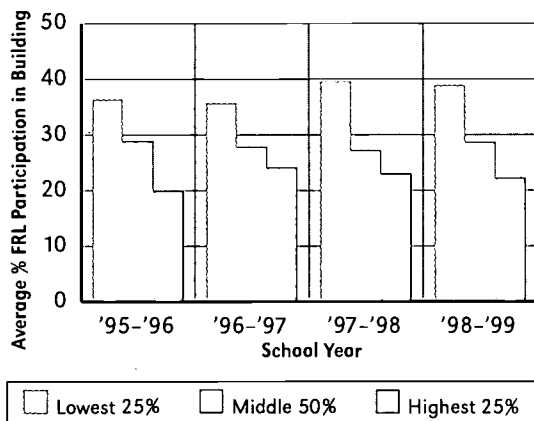
15 See <http://www.dese.state.mo.us/divimprove/curriculum/collegeprep/guidelines.pdf>.

16 See <http://www.cbhe.state.mo.us/acadafrs/hsc.htm>.

**Figure 12A.**  
Average Percent Minority Students in Building by College Attendance Rate



**Figure 12B.**  
Average Percent Participation in Free and Reduced Lunch by College Attendance Rate

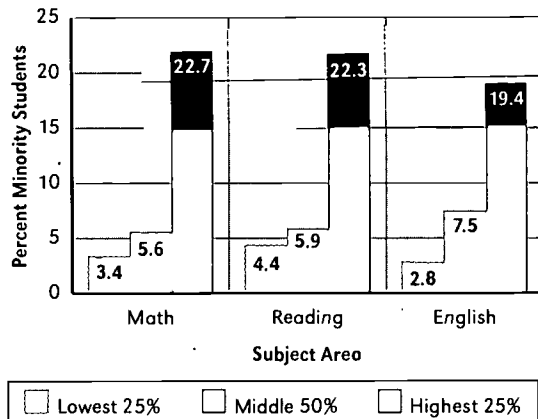


**Source: DESE Core Data**  
Missouri high schools were ranked according to their college attendance rate. The list of schools was then divided into the lowest-performing schools (lowest 25% college attendance rate), average-performing schools (middle 50% college attendance rate), and the highest-performing schools (top 25% college attendance rate).

A. The average percent minority students in the schools in each group is shown for each of four academic years.

B. The average percent FRL participation in the schools in each group is shown for each of four academic years.

**Figure 13.**  
Average Percent Minority Students and the Need for Remedial Work in College



**Source: CBHE EMSAS 1999-2000 Fall Enrollment and DESE Core Data 1998-1999**

Missouri high schools were ranked according to the percent of their 1999 graduates needing remedial work in three subject areas in college in fall, 1999. Students from schools with the lowest percent minority students needed the least amount of remediation, while those from schools with the highest percent of minority students needed the most remediation. The average percent of minority students in a school is shown for each subject area.

**College Freshmen in Need of Remediation**

Data on the performance of freshmen attending Missouri's public four-year institutions further illustrate the gaps in preparation. The percent of a high school's graduates needing remediation in mathematics, reading, or English as college freshmen is related to the high school's minority population.

In contrast, the percent of students who participate in FRL is not strongly related to the percent of students needing remedial coursework (Appendix D). SES may still be a predictor of a student's need for remediation, but the percent of students receiving FRL may be a poorer measure of student SES at the high school level than at lower grade levels. (See detailed explanation in "MAP Scores" section.)

### College Graduation Rates

*Measuring Up 2000* awarded Missouri its highest grade, B-, for college completion. Overall, 46 percent of first-time, full-time college students completed a bachelor's degree within five years, compared to 66 percent in the five highest-rated states. Within the state, the bachelor's degree completion rate varies by institutional selectivity and is calculated on the basis of a six-year graduation rate rather than the five-year rate used in *Measuring Up 2000*. Open-enrollment institutions have a graduation rate goal of 45 percent, and all institutions in this category fell short of this goal in spring 2000.<sup>17</sup> The moderately selective, selective, and highly selective institutions all fell short of their respective goals of 55 percent, 65 percent, and 75 percent, with the exception of the University of Missouri-Columbia, which met its goal of 65 percent.

Missouri has only recently begun to track its in-state college students on the basis of the high school from which they graduated. Currently, the data do not go back far enough to track students six years after graduation, using Missouri's definition of college completion. In the future, this information should be used to identify any gaps in the college graduation rate between high-minority high schools and those with fewer minority students and between high-poverty high schools and those with more affluent students.

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<sup>17</sup> 2001 Progress Report Toward the Statewide Public Policy Initiatives and Goals for Missouri Higher Education, p. 58.

## Consequences of Achievement Gaps

**"K-16-TAGE challenges Missouri's educational policymakers to implement new initiatives that will eliminate achievement gaps. Failure to take such action will have serious consequences for both the individual student and the state of Missouri."**

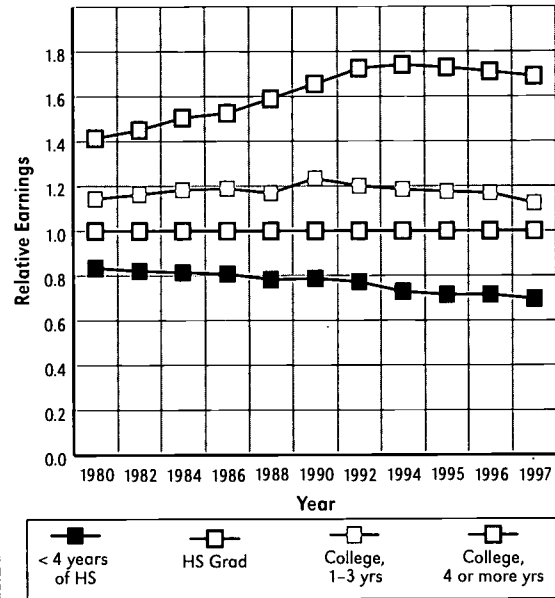
The gaps between Missouri's high-performing and low-performing schools can be measured in many ways. K-16-TAGE challenges Missouri's educational policymakers to implement new initiatives that will eliminate achievement gaps. Failure to take such action will have serious consequences for both the individual student and the state of Missouri.

### Individual Consequences

Missouri's youth are entering a labor market that places a large and growing premium on educational attainment and academic skills. The long economic expansion during the 1990s yielded high and rising returns to workers with high levels of educational attainment. Nationally, the gap in the median weekly earnings between workers without a high school diploma and those with college degrees widened from \$154, in 1980, to \$458 by 1997. When the weekly earnings of workers with a high school diploma are used as a baseline, the relative earnings of those without a high school diploma actually decreased over this time period, while the relative earnings of those with some college education remained stable. The only group to see an increase in relative earnings was that of workers with college degrees (Figure 14).

The continuing globalization of Missouri's economy makes it all but inevitable that these relative-earnings gaps will continue to widen in coming years. In an increasingly open economy, young people who enter the workforce with strong academic skills and the ability to adapt and learn during their careers will prosper, while

**Figure 14.**  
**Relative Weekly Earnings of Full-Time Wage and Salary Workers**



**Source: U.S. Bureau of Labor Statistics**  
The average weekly earnings of workers at various educational levels were divided by the average weekly earnings of high school graduates to determine relative earnings. Only individuals with 4 or more years of college saw their relative weekly earnings rise during this period.

those who enter the workforce with weaker credentials will face the prospect of low and stagnant earnings.

### Statewide Consequences

The consequences of achievement gaps in Missouri have an impact far beyond the individual. State and local revenues are also greatly affected by the earnings of taxpayers. The three industries targeted for economic growth in Missouri (life sciences, advanced manufacturing, and information technology) have average salaries of \$38,000, \$52,000, and \$54,000, respectively, all of which are significantly higher than the average salary for all industries in Missouri (approximately \$28,000).<sup>18</sup> These values represent the combined effect of educational level (see Figure 14) and the

18 Missouri Economic and Research Information Center (see <http://www.ded.state.mo.us/research/>).

**Table 3. New Graduates and Estimated Job Opportunities in Three Target Industries**

Target Industry	Number of New Graduates <sup>19</sup>	Number of Employees <sup>20</sup>	Estimated Number of Vacancies <sup>21</sup>
Life Sciences	7,993	170,000	8,500
Advanced Manufacturing	1,057	121,520	6,076
Information Technology	5,950	74,558	3,723

overall higher salaries for the three targeted industries. A state in which large numbers of undereducated workers are employed in low-wage jobs will take in less revenue in the form of income taxes and sales taxes. Lower wages also mean people purchase lower-priced homes, which translates into lower real estate taxes to fund local public schools.

Achievement gaps also affect Missouri's ability to attract new businesses in the three industries targeted for economic growth. Table 3 shows the relationship between the number of estimated job vacancies at all skill levels in these industries and the number of new graduates with two-year, four-year, and advanced degrees in these areas. In life sciences and advanced manufacturing, the number of graduates is running far behind the estimated demand for workers in these fields. The severity of the problem is not measurable with current data, because the data on employment in these industries are not broken down by educational requirements. The projected shortfalls in available labor also do not take into account any growth in these industries, so these estimates represent a lower limit of the need for additional highly skilled workers. An undersupply of labor translates into increased costs, especially for developing or expanding businesses, and could serve as a disincentive to locate in Missouri.

19 IPEDS Completion Survey data, FY00; includes 2-year, 4-year, and advanced degrees in program areas directly related to the three targeted industries. Data available from the Coordinating Board for Higher Education.

20 Missouri Economic and Research Information Center (see <http://www.ded.state.ma.us/research/>).

21 Assumes a 20-year career in the industry such that, in any given year, 1/20 of the positions would need to be replaced.

## Teacher Quality as a Factor in Achievement Gaps

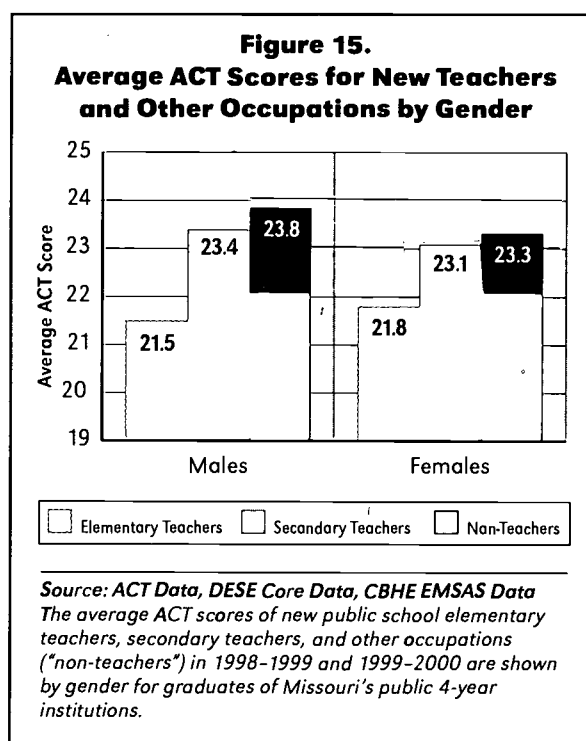
While the demand for public school teachers is rising, the number of students who are completing teacher education programs has been relatively constant. Expanded non-teaching opportunities have led many academically talented women and minorities to choose fields other than education. Nationally, 46 percent of female college graduates received degrees in education in 1959–60, compared to just 12 percent in 1997–98.<sup>22</sup> The share among men fell from 10 percent to just over 5 percent.

### ACT Scores of New Teachers

Evidence indicates that teacher quality plays an important role in student achievement. Low-quality teachers can have a measurable effect on achievement that persists for years. In contrast, high-quality teachers can produce large and persistent student-achievement gains. The exact characteristics that high-quality teachers bring to the classroom are not fully understood; however, several factors have been identified as important. Among these are the general academic ability of teachers, strong content knowledge in their teaching field, and good professional development.

Standardized test scores are one measure of a prospective teacher's academic quality. Considerable evidence demonstrates that the teaching profession does not attract the strongest students. A recent study by the Education Testing Service found that the average SAT scores of candidates for teacher licensure were below those of college graduates as a whole. A more detailed analysis of Missouri's data finds that recent

***"Evidence indicates that teacher quality plays an important role in student achievement. Low-quality teachers can have a measurable effect on achievement that persists for years. High-quality teachers can produce large and persistent student-achievement gains."***



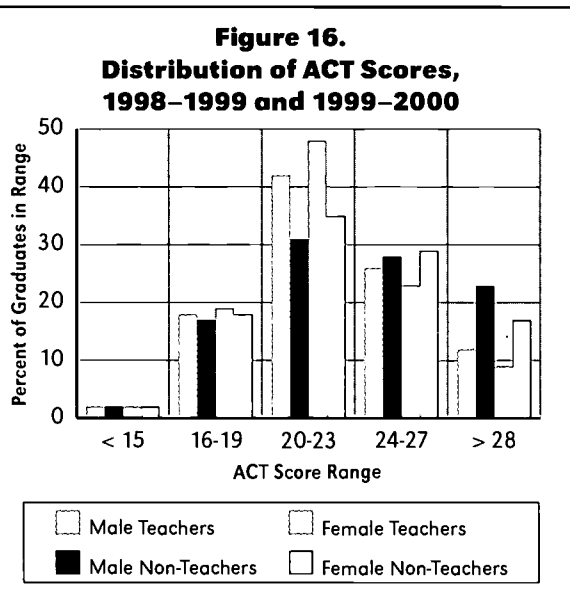
public four-year college graduates who began teaching in Missouri's public schools have ACT scores below those of public four-year graduates who pursued careers in other fields (Figure 15 and Appendix E). The gap is most pronounced for students who entered elementary school teaching. At the secondary level, new teachers have ACT scores slightly below those of graduates who entered other professions.

Teachers with high ACT scores are more likely to quit teaching in their first few years on the job than are their low-ACT colleagues. After 7 years, only 53 percent of male teachers and 49 percent of female teachers with ACT scores above 27 were still in the profession, compared to 57 percent and 60 percent of their respective counterparts with ACT scores of 19 or below. Unless high-ACT employees from other fields enter the teaching profession at the same rate that high-ACT teachers leave teaching, the gap between ACT scores of

22 U.S. Department of Education. National Center for Education Statistics. *Digest of Education Statistics, 2000.*

**Table 4. Descriptions of Skills and Knowledge Associated with ACT Score Ranges**

Score Range	Description of Skill
16–19	Solve basic grammatical problems such as when to use an adverb or adjective
20–23	Ensure that a verb agrees with its subject when there is some text between the two
24–27	Ensure that a pronoun agrees with its antecedent when the two occur in separate clauses or sentences
28 and above	Ensure that a verb agrees with its subject in unusual situations, such as when subject-verb order is inverted



**Source: ACT Data, DESE Core Data, CBHE EMSAS Data**  
The ACT score distributions of graduates of Missouri public institutions in 1997–1998 and 1998–1999 who entered the teaching profession are compared to scores of graduates who entered other occupations (“non-teachers”). The score ranges correspond to the relative selectivity of colleges and universities. As defined by ACT, the 24–27 score range is typical of applicants to selective institutions, and scores of 28 and higher are typical for those to highly selective institutions. Substantially more teachers have ACT scores in the 20–23 range as compared to their non-teaching peers, and fewer new teachers have ACT scores above 28 compared to graduates who pursue other careers.

describes the skills and knowledge associated with each score range. A skill listed for a particular range has not been mastered by those who score in lower ranges. For example, a large fraction of new teachers (those scoring at or below 23) were unable to match a pronoun to its antecedent in moderately complex sentences (Table 4).

A teacher’s mastery of skills such as those described in Table 4 has a significant impact on the performance of his or her students. Figure 17 shows the average ACT score for teachers whose students perform in the lowest quartile, the middle 50 percent, and the highest quartile on three subject-area MAP tests. In all subjects and at all levels, the lowest-performing students had teachers with the lowest ACT scores, and the highest-performing students had teachers with the highest ACT scores.

**Inequalities in the Distribution of High-Quality Teachers**

In a recent *Chicago Sun-Times* article<sup>23</sup> on school and teacher quality, one educator said:

[W]e need a culture that promotes the idea that the best teachers should be with the neediest students. In business, they always put their best people on the most challenging cases.

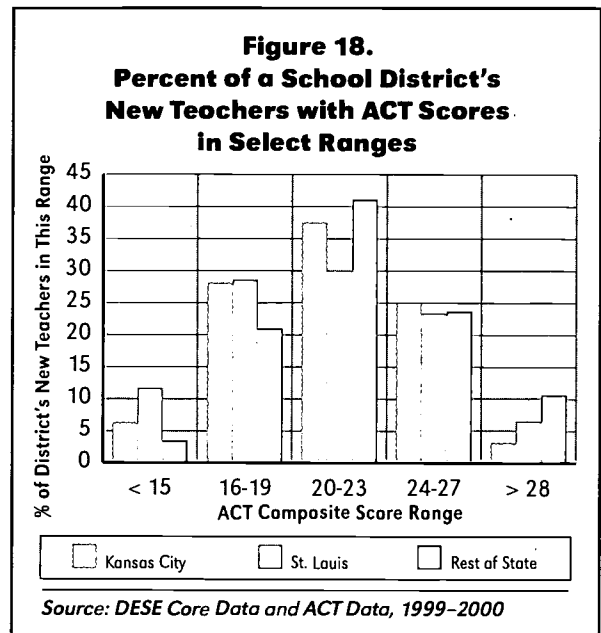
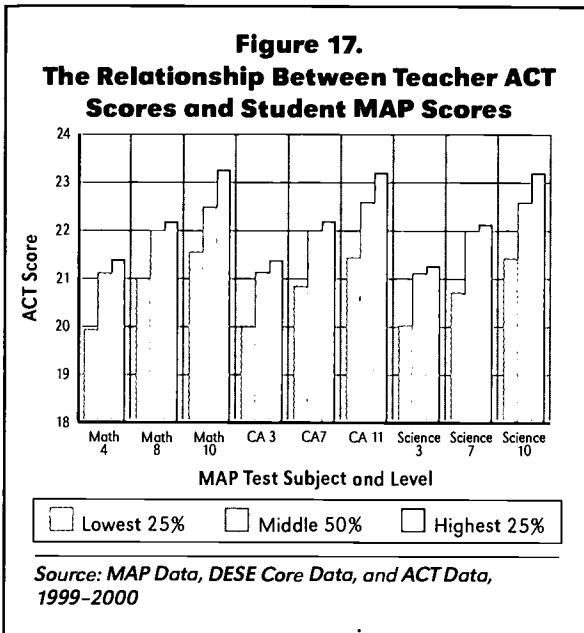
teachers and those in other professions is expected to widen.

The data in Figures 15–16 are even more disturbing in light of the academic skills associated with each of these score ranges. For each of the subject areas, the ACT

Missouri’s current practices run counter to this philosophy. Unfortunately, students in urban school districts are least likely to get quality teachers and teaching in their

<sup>23</sup> “Poorest Kids Often Wind Up with the Weakest Teachers.” *Chicago Sun-Times*, September 7, 2001.





**Table 5. Average Percent Building Poverty by New Public School Teacher ACT Scores in 1998–1999 and 1999–2000**

New Public School Teacher ACT Score Range	Percent FRL-Participating Students in School Building	
	Male	Female
15 or lower	46.3%	53.5%
16–19	42.5%	43.8%
20–23	35.0%	40.6%
24–27	32.6%	36.2%
28 or higher	30.1%	31.4%

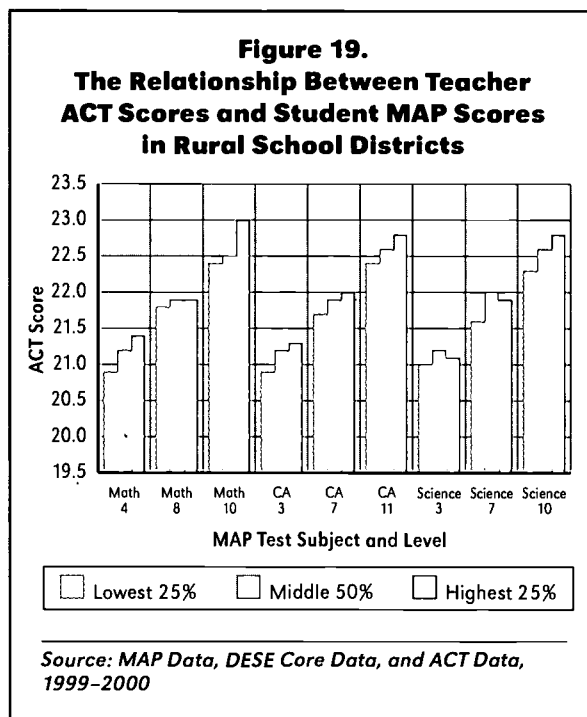
Source: DESE Core Data and ACT Data  
On average, a teacher with an ACT score in a given range teaches in a building with the indicated percentage of students who participate in FRL.

classrooms. Missouri's high-minority/high-poverty school districts not only have a disproportionate share of new teachers with below-average ACT scores, but they also have lower-than-average percentages of new teachers with above-average ACT scores (Figure 18 and Appendix E).

As Table 5 illustrates, there is a relationship between school poverty and the average ACT score of its new teachers. Schools with higher percentages of low-SES students are more likely to have a higher percentage of new teachers with ACT scores in the lower range. Since the lowest-performing schools tend to have the highest poverty levels, as measured by FRL participation, this exacerbates the problem of decreased student achievement (Appendix C).

**Teacher Quality as a Factor in Achievement Gaps**

The data in Figure 17 underscore a state-wide problem. Teachers with the lowest ACT scores are teaching a disproportionate share of students with MAP scores in the lowest quartile. Teacher quality impacts student performance regardless of location and student characteristics. As seen in Figure 19, the average ACT scores of teachers in rural schools whose students performed in the lowest quartile, middle 50 percent, and highest quartile on the MAP tests follow a pattern similar to the profile for all teachers in Missouri (Figure 17), except for teachers of elementary and middle school science. On the whole, there remains a link between teacher quality and student performance, regardless of school location.

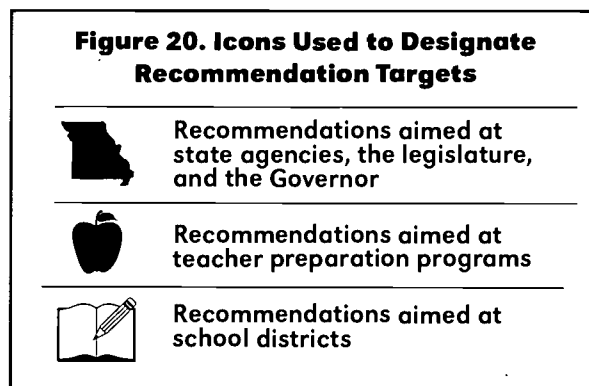


## Recommendations

Missouri's students are lagging behind their peers in the rest of the country in their preparation for, and participation in, higher education. Students with weak teachers are even less likely to be prepared for college because of their weaker preparation in the K-12 system. Although low-performing schools are found throughout the state, they tend to be concentrated in Missouri's urban school districts. Many students in these districts are members of minority groups and are from lower SES households. These students should not have to shoulder the additional burden of trying to learn from a teacher with weak academic credentials. If Missouri is to eliminate achievement gaps, then it is necessary to eliminate the teacher quality gap.

An important objective of any effort to improve student achievement must be to improve teacher quality. Missouri regulatory and leadership departments play an important role in this effort. The CBHE and the State Board of Education (SBE) have statutory responsibility for directing educational policy. The SBE sets the requirements for teacher certification for both Missouri and out-of-state graduates, approves new teacher education programs, and systematically evaluates existing programs. The CBHE's program approval responsibility includes new degrees in education at public institutions. New education degrees at independent institutions are submitted to the CBHE for review and comment. Together, the CBHE and the SBE can have a major impact on the quality of Missouri's teachers. Missouri legislators and the Governor also have a responsibility to commit state revenue to specific programs with a high probability of improving teacher quality.

Teacher education programs are a critical aspect of any effort to improve teacher quality. The challenge of raising the quality of newly certified teachers can be addressed on several fronts simultaneously. Implementation of approved teacher education programs is the responsibility of



the colleges and universities that prepare prospective teachers. These institutions set program admissions requirements, hire the faculty to teach the courses, and set transfer policies that can hinder or assist a student who began his or her education at another institution.

Providing financial incentives and policy direction at the state level and assuring the quality of new teachers at the program level are essential elements of a school improvement strategy. The success of these efforts hinges on the quality of leadership within a school building or district. Building principals have a responsibility to set standards by implementing sound hiring practices, supporting professional development, and creating mentoring programs for new teachers. School districts have a responsibility to maintain and enhance the knowledge and skills of their teachers and administrators through high-quality, job-related professional development. School boards have a responsibility to develop salary schedules that reward district personnel for undertaking advanced education that is consistent with the district's goals.

In the recommendations below, the K-16-TAGE has identified both primary and secondary recommendations. The primary recommendations are those that the K-16-TAGE believes will have a significant and immediate impact on teacher quality and student performance. The secondary recommendations address teacher quality on a smaller scale or over a longer timeline. Each recommendation assigns responsibility

**Table 6. Average Salaries of Missouri Public Four-Year College Graduates in Teaching and Other Occupations, 1997–1998 and 1998–1999**

ACT Score Range	Average Teacher Pay		Average Pay, Other Occupations	
	Male	Female	Male	Female
15 or lower	\$25,883	\$25,522	\$25,643	\$20,353
16–19	\$25,592	\$24,392	\$26,026	\$22,407
20–23	\$25,497	\$24,230	\$28,441	\$22,776
24–27	\$25,443	\$24,386	\$27,583	\$23,932
28 or higher	\$25,050	\$24,366	\$29,777	\$24,410

Source: DESE Core Data, ACT Data, CBHE EMSAS Data, Missouri Department of Labor and Industrial Relations

ity to one of three groups (e.g., the state, teacher education programs, or school districts), as described by the coding scheme in Figure 20.

**Primary Recommendations**



**Design a financial incentive of at least \$10,000 annually per teacher to attract the highest-quality new and continuing teachers to low-performing schools and retain them at these schools.**

Teaching is one of the few professions where there is virtually no salary differential for the top recruits. Most teacher salaries are determined by a single, district-wide schedule in which pay increases are determined by years of service and amount of post-baccalaureate education, not by the teacher’s academic credentials or success in the classroom. This is in contrast to many other professions, where the top students are offered higher starting salaries than their less-able peers (Table 6) and where salary increases are tied to job performance.

A financial incentive program to attract high-achieving students to, and retain them in, the teaching profession is recommended. Such a program would make

teaching more competitive with alternatives available to new graduates. Eligible participants would be newly certified teachers who elect to teach at low-performing schools and who meet stringent requirements in terms of college GPA, ACT or SAT scores, C-BASE scores, and scores on the Praxis II exams. An eligible teacher would have a minimum of \$10,000 in a tax-free<sup>24</sup> trust for each of the first three years of teaching in a low-performing school. Since the highest exit rate for new teachers occurs in the first three years of teaching, this requirement would provide an incentive to continue in the teaching profession. If a teacher remained in a low-performing school for more than three years, \$10,000 deposits to the trust would be made annually for two more years.

Financial incentives are also needed to attract experienced high-quality teachers to low-performing schools and to retain the high-quality teachers already in these schools. Just as for new teachers, participants would have to meet stringent eligibility requirements in terms of college GPA, ACT or SAT scores, C-BASE scores, scores on the Praxis II exams, and other classroom performance measures such as teaching evaluations, portfolios, or value-added assessments of their students. Current teachers who meet eligibility

24 The program would be free from Missouri taxes initially. If funded at the national level, the trust would be free from federal taxes as well.

requirements (including teaching in, or moving to, a low-performing school) would receive the same benefits as new teachers and would be subject to the same years-of-service requirement in order to draw on the funds in the trust. Teachers moving to Missouri from other states who meet the same quality standards as Missouri teachers would have access to the same incentive program if they teach in a low-performing school.

New and experienced teachers receiving these financial incentives would have opportunities to participate in professional development aimed at addressing the challenges of teaching in a low-performing school. Several other recommendations in this report acknowledge the importance of sustained, job-related professional development in enhancing student performance.



**Hold teacher preparation programs that admit underprepared students accountable for the performance of their graduates and implement new teacher certification policies for graduates of out-of-state institutions.**

Missouri students experience a grave injustice when they are assigned to classrooms with underprepared teachers. In 1998, two Missouri teacher preparation institutions had average ACT scores below 20.0 for their newly certified graduates.<sup>25</sup> As discussed earlier (Figure 17), there is a correlation between the quality of the teaching workforce, as measured by ACT scores, and the achievement of K-12 students. The significance of the relationship between teacher quality and student achievement is recognized at the national level. A 1998 amendment of the Title II Higher Education Act requires states to submit annual reports on the status and quality of teacher education programs to the U.S. Department of Education.<sup>26</sup>

Raising admissions standards for teacher preparation programs is one approach to improving teacher quality. However, the K-16-TAGE recognizes that many students do not achieve their full academic potential in high school. Furthermore, one test on one day cannot predict one's potential as a teacher. Nonetheless, there is enough research about the impact of a teacher's intellectual achievement on student performance to justify the need for a system to measure the value added by a college or university. Missouri needs some measure of teacher quality that ensures the academic development of low-ACT students during their teacher preparation program.

One strategy for enhancing K-12 student achievement is to make Missouri teacher education programs with low admissions standards accountable for the aggregate performance of their graduates. As part of this initiative, a program that admits 15 percent or more of its entering teacher education students with an ACT below 23 would be identified as a targeted program. Transfer students who complete mid-preparation coursework and an associate degree at a DESE-approved community college program should be considered separately. Targeted programs would be held accountable for the content knowledge of their graduates beyond that reflected by their scores on the Praxis II exit examinations required for certification. Beginning two years after their institution's identification as a targeted program, students completing the teacher education program would be required to take tests equivalent to the MAP tests given to high school students. The targeted programs would be responsible for ensuring that their graduates are able to pass all MAP-like high school tests at the proficient level or higher. Programs failing to meet this standard would be put on probation. School districts would be notified of a program's probationary status. Two successive years of probation would

25 See <http://www.dese.state.mo.us/divteachqual/teached/teacherpreprof00/>.

26 See <http://www.ed.gov/offices/OPE/News/teacherprep/>.

## Recommendations

result in loss of program approval by the SBE. Programs losing state approval could no longer enroll any new students. These programs, however, would be expected to work with students already enrolled so they could complete their degrees and receive certification.

Making Missouri teacher education programs accountable for the quality of their graduates will have little effect on the teachers who receive their preparation out of state. In 1999–2000, 27 percent of all new teachers in Missouri were educated at out-of-state institutions. This presents a challenge to teacher quality in Missouri because these new out-of-state teachers had an average ACT score one full point below that of new teachers educated at Missouri's public and independent institutions. Their C-BASE scores showed an even greater gap, at 11.4 points lower than that of Missouri-educated teachers. In order to assure an adequate supply of teachers while simultaneously maintaining the quality of new teachers from programs outside Missouri's jurisdiction, new teacher certification policies should be implemented. Teachers from out-of-state institutions would receive a temporary teaching certificate. Those with ACT scores below 23 or Praxis II scores below the national average would be required to demonstrate Praxis II scores at or above the national average prior to receiving a provisional certificate.

The members of the K–16-TAGE also believe it is critical to administer a MAP-like test in core subjects to all graduates of Missouri's teacher preparation programs before limiting their use to only targeted programs. This step would provide necessary external validation of the relationship between a student's ACT score and his or her ability to teach the content covered in the Show-Me Standards and assessed by the MAP tests administered to Missouri's K–12 students.



### **Establish standards for the quality of teaching in a building and the quality of building leadership in a district.**

Business leaders have long known that quality begins at the top. In a large corporation, the expectations for success or mediocrity most often originate with the CEO. Success is not possible without the commitment of all the corporation's employees. For that reason, unit and department managers have a responsibility to find the highest-quality employees, to provide learning opportunities for those who need to hone existing skills or to learn new ones, to promote employees who have demonstrated their ability to exceed the unit's goals, and to replace individuals who are not contributing to the corporation's goals.

The same mindset should hold in education. Principals should hire graduates from strong teacher education programs. Principals should also identify teachers whose students are performing at low levels and either assist these teachers with appropriate professional development or help them make a successful career change. Principals should identify teachers whose students are performing well and find ways to reward these teachers with monetary or non-monetary incentives such as release time for service as mentor-teachers or nomination for district, state, or national awards. Principals also need to have the means to assess teachers' competencies and to remove teachers whose students consistently fail to meet performance goals. Anecdotal evidence suggests that school boards often protect tenured teachers who are incompetent. When this is the case, principals and school district staff fail to be aggressive in holding teachers accountable for student achievement. Over time, this results in failing schools and failing students.

Similarly, superintendents should be held to the same standards as building principals. In 1999–2000, the average composite

ACT score of Missouri principals under the age of 45 was 21.6, about the same as the average for new elementary teachers (Figure 15).<sup>27</sup> As district leaders, superintendents have a duty to consider the academic qualifications of the principals they hire. They must also exercise their responsibility in hiring and firing building principals on the basis of the performance of their students. Superintendents serve as spokespersons for their school district's values and priorities and therefore must communicate the professionalism of teaching to the principals, teachers, and citizens in their district.

If school and building leaders are being held accountable for the performance of those who report to them, they need access to professional development to learn or refine the essential skills necessary for success in their positions. Superintendents and principals usually come through the ranks as classroom teachers and may have advanced degrees in educational administration. Although continuing education in these fields is important, it is equally important for administrators to learn leadership strategies that have proven successful in other fields and that are transferable to education. These learning experiences may be provided at professional conferences, which also give building and district leaders the opportunity to network with their peers. Time and money should be made available to support superintendents and principals in these efforts. Priority would be given to superintendents and principals in low-performing districts or schools.



**Assess the content knowledge of teachers in low-performing schools and provide content-based professional development for those with deficiencies.**

Will Rogers has been quoted as saying "You can't teach what you don't know, any more than you can come back from where you ain't been." Although subject-matter knowledge is essential for learning to occur, the amount of knowledge needed to help students learn is less obvious. Some state assessments require teachers to know only the subject matter covered by the curriculum. In order to inspire curiosity and excitement about a discipline, teachers need knowledge that goes beyond the content officially being taught.<sup>28</sup> When a teacher is teaching out of field, the teacher may lack a depth of knowledge in the discipline and may also lack a deep understanding of its relationship to other disciplines. This is especially true in science and mathematics, where large numbers of teachers are not certified in these disciplines.<sup>29</sup> Similar challenges exist in Missouri. Of the subjects assessed on MAP tests, science is most likely to be taught by a teacher not certified in the sciences. The three-year trend for all MAP subject areas shows that out-of-field teaching is on the increase (Appendix F). Data are not currently available on the distribution of out-of-field teaching at low-performing versus high-performing schools, but because of the lower supply of qualified science and mathematics teachers, it is expected that low-performing schools would have above-average numbers of students taught by teachers without appropriate certification. This puts their students at even greater risk for lower achievement.

Regardless of the underlying cause for lack of content knowledge, professional devel-

27 DESE Core Data; ACT Data.

28 Hilton, P.J. (1990). What Teachers Need to Know about Mathematics. In D. Dill, ed., *What Teachers Need to Know: The Knowledge, Skills, and Values Essential to Good Teaching*. San Francisco: Jossey-Bass.

29 Nationally, in 1990-1991, 37.5 percent of science teachers and 47.4 percent of mathematics teachers were not certified in their respective fields. Data from U.S. Dept. of Education Schools and Staffing Survey.

## Recommendations

opment should be focused, coordinated, and content-driven to assure that current investments are producing results. The first step toward improving the content knowledge of teachers at low-performing schools is to identify these schools. An analysis of the MAP student test scores from the 1999–2001 school year could be used to target low-performing schools. All teachers in low-performing schools should be required to take the Praxis II subject-area exams as a means of diagnosing specific content deficiencies among these teachers. As part of this initiative, elementary teachers would be required to take content-based assessments in English and mathematics in addition to the elementary education Praxis II exam. Teachers whose Praxis II scores or other assessment scores fall below the national average would be eligible to receive state funds to enroll in content-specific professional development courses. Teachers scoring below Missouri's established cut-score would be retested annually as long as the school remains low-performing. All teachers in a low-performing school would have to pass the Praxis II at or above the Missouri cut-score prior to certificate renewal.



### **Implement an effective accountability system for Regional Professional Development Centers (RPDCs).**

Missouri operates eight Regional Professional Development Centers (RPDCs) strategically located at university sites across the state as well as a center in conjunction with the Cooperating School Districts in the St. Louis area. These organizations have wide-ranging responsibilities to design and facilitate programs that improve and enhance teachers' skills and knowledge. Of its \$15 million annual investment in professional development, DESE invests more than \$2 million in the RPDCs. RPDCs have a responsibility to assure Missouri taxpayers that their activities translate into improved student achievement.

An accountability system for RPDCs should incorporate a number of features. Participants in RPDC activities should be assessed before and after the experience in order to measure the value added to the individual teacher. A longer-term goal of RPDCs should be to assess K–12 students annually (using instruments in addition to the MAP test) and to track the data at the individual student level in order to determine the impact of the teacher's professional development experience on student learning. Because a teacher's content knowledge is vital for student achievement, RPDCs should involve more faculty members from Colleges of Arts and Sciences in the design and delivery of content-based professional development. Continued funding of the RPDC should be awarded on the basis of an RPDC's demonstrated effect on student learning.

RPDCs should be held accountable for assisting low-performing schools and districts. Currently, 94 of the state's school districts have been offered assistance through what DESE has designated as "Success Teams." Districts are identified at least two years prior to their accreditation review visit, and many elect to continue to receive assistance following the review. Evaluation of the effectiveness of the RPDC and its director should be the collective responsibility of the Commissioner of Education, the Commissioner of Higher Education, and the president of the university with which the RPDC is affiliated. The accountability system should reorganize the chain of command so that the RPDC director reports directly to the university president. The RPDC director should be held accountable for the impact of the programs offered by the RPDC, and the university president to whom the director reports should be given the authority to replace an ineffective RPDC director.





**Design teacher education programs to increase understanding of urban education.**

The problems associated with urban school districts have made it difficult to attract and retain new teachers. There is an increased need to equip prospective teachers with a better understanding of the challenges and rewards associated with teaching in an urban school. Many of the challenges arise from the large cultural differences between prospective teachers and the students in urban school districts. Relatively few graduates of Missouri's teacher education programs are members of minority groups, yet approximately 80 percent of the students in Kansas City and St. Louis are members of minority groups (Figure 1). Likewise, teacher education graduates are unlikely to have grown up in poverty, given that college attendance rates for those eligible for FRL tend to be lower than the college attendance rates of more affluent high school graduates (Figure 12).

There are multiple avenues for improving prospective teachers' understanding of urban education. As part of an urban residential teaching program, colleges and universities would collaborate with each other and with an urban school district to provide an extended urban-education experience for teacher education students. A unique feature of such a program would be the creation of a learning community, in which program participants would live together in a residence hall within the urban school district in which they would teach. A pilot program of this type is underway in Kansas City. The establishment of Professional Development Schools in urban areas is another model used to provide teacher education students with an understanding of urban education. In the St. Louis Public Schools, there are 7 Professional Development Schools that provide pre-service students with clinical experiences and site-based coursework. Additional programs similar to the Urban Residential Teaching Program in Kansas

City and the Professional Development School program in St. Louis should be created or expanded in other areas of the state in order to increase the number of prospective teachers who have access to this experience. These types of university-school district partnerships would also provide opportunities for students from teacher education programs in suburban or rural areas to have short-term field experiences or to do their student teaching in urban settings. The urban education programs would partially overlap the financial incentives program for teachers in low-performing schools. High-quality graduates of an urban residential teaching program who choose to teach in low-performing schools would be eligible for the same financial incentives as other new teachers.

**Secondary Recommendations**



**Develop a coordinated K-16 data collection process for analyzing student performance.**

DESE has statutory responsibility to collect data about public K-12 schools, students, and teachers. The CBHE has similar responsibilities in public higher education. Answers to important research questions require data that overlap these sectors such as the K-12 schools attended by public college or university graduates. Recently, DESE and the CBHE have increased their collaborative efforts to collect the data needed to study these questions. Elsewhere in this report, the K-16-TAGE noted a number of challenges faced when attempting to analyze data obtained from DESE and the CBHE. Greater collaboration is needed to ensure that the state's data collection and analysis processes are positioned to help researchers answer questions about student performance at the interface between K-12 and higher education.

Mechanisms should be developed for collecting and analyzing relevant student information data, as recommended in *Mathematics in Missouri: A Report of the Mis-*

## Recommendations

ouri K-16 Coalition.<sup>30</sup> Specifically, DESE and the CBHE should use common data definitions, link their separate databases, and develop a common research agenda that can inform future K-16 policy decisions. Because sufficient data may take time to accumulate and because certain data sets such as college graduation data inherently require time to elapse before they can be collected, DESE and the CBHE should increase their collaborative efforts immediately.

The goal of an improved data collection process is not to collect more data, but to make better use of the data collected by DESE and the CBHE. The K-16-TAGE acknowledges DESE's commitment to make building-level student performance data readily available on its web site. Task Force members encourage parents, school boards, and community leaders to access this information in order to make informed decisions about the education of their students.



**Use the results of research to align teacher education program and certification requirements and to enhance the state's ability to evaluate teacher education programs.**

DESE's Division of Teacher Quality and Urban Education evaluates teacher education programs in Missouri colleges and universities and issues certificates for all professional educators. Program evaluations are conducted using the competency-based Missouri Standards for Teacher Education Programs (MoSTEP), while certification remains largely course- and credit hour- based (see <http://www.dese.state.mo.us/divteachqual/teachcert/certreq.html>). This creates challenges for institutions as they attempt to align courses with specific competencies.

There are a number of steps that should be taken in order to improve the alignment between teacher education program requirements and teacher certification requirements. The state should expand its review of research on teacher preparation in other states. Missouri should also participate in, and provide support to, educational research studies aimed at identifying those characteristics of a teacher education program that are most closely linked to teacher quality and student achievement. Since a large percentage of a future teacher's education takes place outside the College of Education, these research studies should engage arts and sciences faculty. The K-16-TAGE recommends that colleges and universities establish task forces of faculty in the College of Education and the College of Arts and Sciences to align the content knowledge in the courses they teach to prospective teachers with the statewide K-12 curricula and assessments.

The research studies should address the unevenness in quality among institutions that prepare teachers, while remaining sensitive to the institution's mission and constituents. Once sufficient research data have been collected, state agencies should investigate the alignment of current teacher preparation programs with the attributes of successful programs and take the necessary steps to modify state certification and institutional program requirements to maximize positive results. This could include raising the Praxis II cut-scores for certification if research provides sufficient evidence or, alternatively, replacing the Praxis II with another assessment instrument closely aligned with the MAP.

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30 Report of the Missouri K-16 Coalition to the State Board of Education, the Coordinating Board for Higher Education, and the University of Missouri Board of Curators, 1999.



**Reward professional development with higher pay on school district salary schedules when professional development is directly relevant to an individual's school district position.**

The completion of requirements leading to initial teacher certification is the first phase of what must become a continual, seamless process of career-long learning. Yet too often, teacher professional development comes in the form of "in-service education," involving short (typically one-day) workshops that may not be sufficiently focused to be useful. Alternatively, teachers are sent to conventions, where they attend sessions on a variety of topics, collecting isolated teaching ideas that may or may not be useful or practical in their own classrooms. This sort of professional development rarely leads to meaningful changes in teaching that translate into improved student performance. Evidence is beginning to accumulate that suggests that sustained, job-embedded professional development can have a significant impact on student learning.<sup>31</sup> Although participation in some professional development programs may include a small stipend, most professional development does not lead to advancement on a district's salary schedule unless it is taken for college or university credit. In some school districts, advancement on the salary schedule begins with as few as six post-baccalaureate credit hours. However, many teachers in Missouri are taking college or university courses and/or earning advanced degrees in fields that are not related to their teaching assignment. In some cases, teachers take credit courses in areas where they would like to grow professionally, e.g., as in educational leadership or counseling. In most districts, there is currently no requirement that advancement on the salary schedule be provided only to those

teachers whose course credit is in a field related to their primary assignment.

Advancement on the salary schedule should be provided only to those individuals whose credit or non-credit professional development has immediate value to the district in terms of student or school performance. Extra incentives should be provided to teachers who choose to take advanced courses in the disciplines that they teach, e.g., as math teachers who take graduate-level math courses. Although credit courses are easy to quantify, school districts should also devise ways to quantify non-credit, job-related professional development so that it can be used to advance a teacher on the salary schedule. This could take the form of a career ladder (see <http://www.dese.state.mo.us/divteachqual/careerladder/>) in which formal professional development is part of a larger plan for the teacher's continued improvement. DESE should provide assistance to school districts without the resources or infrastructure to develop a career ladder on their own. Furthermore, teachers or administrators obtaining advanced degrees in fields outside their original assignment should move up the salary schedule only when they make a career change in order to apply their new knowledge and skills to their school district assignment.



**Design fast-track teacher certification programs that target quality mid-career and retired professionals for recruitment into the teaching profession.**

The traditional source of K-12 teachers (college majors with baccalaureate degrees in education) may become inadequate in Missouri's new economy. The teaching profession is attractive to many mid-career professionals. This includes individuals who enlisted in the armed forces in the late 1970s and early 1980s and who are

<sup>31</sup> For example, see evaluation results for the "Enhancing Missouri's Instructional Networked Teaching Strategies" (eMINTS) Program (<http://emints.more.net/evaluation/reports/>). The eMINTS Program includes 200 or more hours of structured professional development and in-classroom coaching over a multi-year period.

## Recommendations

either newly retired or will soon retire from the military. Missouri now offers alternative certification that allows an individual to begin teaching while simultaneously undertaking a program of study approved by the school district, a local college or university, and DESE.

Teacher education programs and school districts should collaborate to identify successful models of alternative and accelerated certification, both in Missouri and throughout the country. Next, both groups should conduct rigorous research to uncover the underlying factors in each program's success and to replicate the best features of successful programs at other locations around the state. The Kansas City Teaching Fellows Program, funded by the Kauffman Foundation, is one model that should be studied. Prospective teachers participate in an intensive learning experience the summer before they begin teaching, then continue with coursework leading to certification. The summer training program may prove to be one of several factors in the program's success, although it may not be attractive to all professionals interested in becoming teachers because of its relatively lengthy certification process (30 or more credit hours in many cases). Other more streamlined curricula leading to certification may be in place at institutions in other states, e.g., South Carolina's "Troops to Teachers" program.<sup>32</sup> Missouri institutions should explore the feasibility of adapting these programs to increase the opportunities available to mid-career professionals interested in becoming teachers. Schools and school districts may also benefit from the leadership capabilities of individuals outside the field of education. Policies should be developed that enable talented individuals to become principals or superintendents without a lengthy certification process. The K-16-TAGE is encouraged by increased legislative interest in promoting fast-track and alter-

native certification programs for principals and superintendents.



**Develop a statewide, competency-based, articulated teacher education curriculum for the first two years of college.**

Missouri's community colleges continue to serve the postsecondary education needs of many citizens, including those who will become teachers. In 1999-2000, 21.5 percent of new teachers who graduated from Missouri's public institutions had completed 24 or more credit hours from a 2-year college, and 16.9 percent had completed 36 or more credit hours.

In order to attract a broad range of students into the teaching profession, policies should be developed to eliminate the barriers experienced by transfer students pursuing teacher certification. Transferring coursework from one institution to another is far from seamless and can be a deterrent to continuing on the path toward teacher certification. In its study of education coursework transfer policies, the *ad hoc* Teacher Education Articulation Advisory Committee (TEAAC), appointed by the CBHE Committee on Transfer and Articulation (COTA), identified a number of concerns involving the transfer of education credit from two-year to four-year institutions and between four-year institutions.<sup>33</sup> As state requirements for teacher certification change and four-year institutions modify their programs to accommodate these changes, students who have already taken courses at other Missouri institutions often find that their courses no longer transfer. Many of the concerns identified by TEAAC would be eliminated by the development of a statewide, competency-based Applied Science degree in teacher education that would be accepted by all public four-year institutions.

<sup>32</sup> See <http://www.hehd.clemson.edu/TTT/>.

<sup>33</sup> Final Report of the Teacher Education Articulation Advisory Committee.



**Increase public recognition and prestige of leaders of schools or school districts that make significant academic improvements.**

DESE has statutory responsibility to oversee the quality of Missouri's public schools and to intervene if a school or district is not up to standard. Positive incentives also have the potential to change the behavior of school district leadership. The K-16-TAGE encourages private organizations and businesses to develop monetary awards that recognize quality teaching in Missouri schools.

State leaders should also identify creative, motivating, non-monetary incentives that would lead to improved student performance. At the upper levels of a profession, the esteem of one's colleagues can be as valuable as other forms of rewards. By developing a competitive, prestigious "Governor's Award" for superintendents and principals who make great strides in improving performance in low-performing schools, Missouri would be helping to improve all schools. This award would be announced publicly and presented at a state education conference. Recipients would also be designated as "mentors" to other school districts from around the state that hope to emulate the award recipient's success.

## Conclusion

The K-16-TAGE believes that improving teacher quality is the single most important factor in eliminating the achievement gaps among Missouri students. The state can participate in efforts to improve teacher quality by funding incentives aimed at attracting the strongest students to the teaching profession. Colleges and universities can work toward raising the standards for admission to, and graduation from, their teacher preparation programs. School districts can influence teacher quality through their hiring, mentoring, and professional development practices.

The K-16-TAGE recognizes that teacher mobility is another potential challenge to quality. The standards proposed for Missouri teachers would also apply to teacher candidates from other states seeking to obtain certification via reciprocity. As Missouri adopts new measures to improve teacher quality, it is essential that new and experienced teachers from other states be held to the same standards as teachers who receive their preparation at Missouri institutions.

Missouri will have a much brighter future by eliminating achievement gaps among Missouri students. Failure to eliminate these gaps will jeopardize the economic future of large numbers of Missouri citizens as well as reduce Missouri's opportunities for continued economic growth and development.

**Appendix A: Measuring Up 2000 Data**

Table A.1. Letter Grades for Lowest-Performing States

State	GPA	Preparation	Participation	Affordability	Completion	Benefits
Louisiana	1.0	F	F	C-	C	D+
West Virginia	1.2	D+	D+	D	C	F
Arkansas	1.2	D	D-	C+	D+	D-
Nevada	1.5	D+	D+	B	F	C-
Georgia	1.5	D+	F	D+	B-	C

Table A.2. Letter Grades for Highest-Performing States

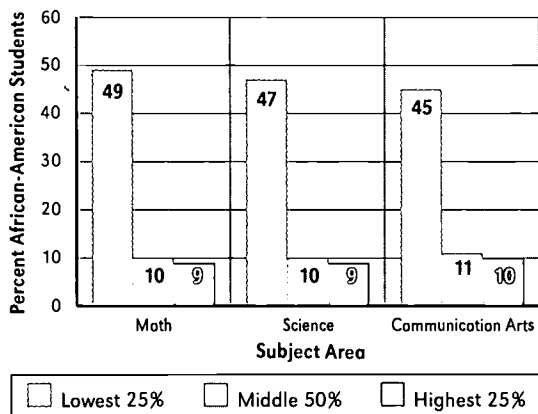
State	GPA	Preparation	Participation	Affordability	Completion	Benefits
Illinois	3.4	A	A	A	C+	B-
Connecticut	3.4	A	B+	C	B+	A
New Jersey	3.4	A	B+	B	B-	A
Massachusetts	3.2	A	A-	D	A-	A-
Wisconsin	3.2	A-	B	B+	B	B-
Rhode Island	3.2	C	A	F	A	A
Kansas	3.2	B	A	B	B	B

Source: *Measuring Up 2000: The State by State Report Card for Higher Education.*

## Appendix B: Ethnic Group Representation By School Performance Quartile on MAP Tests

**Figure B.1.**

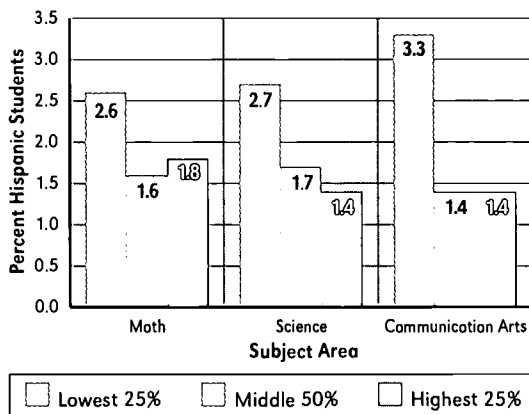
**Percent African-American Students by School Performance Quartile on 3rd and 4th Grade MAP Tests**



*Source: DESE Core Data and MAP Data, 1999–2000*  
 Missouri elementary schools were ranked according to their average MAP scores for mathematics (4th grade), science (3rd grade), and communication arts (3rd grade). The list of schools was then divided into the lowest-performing schools (lowest 25%), average-performing schools (middle 50%), and the highest-performing schools (top 25%). The average percent African-American students in a school is shown for each subject area.

**Figure B.2.**

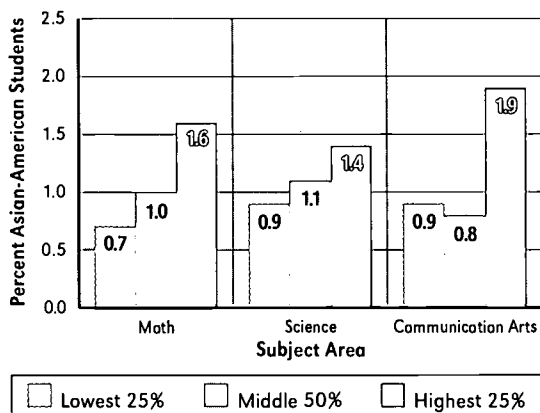
**Percent Hispanic Students by School Performance Quartile on 3rd and 4th Grade MAP Tests**



*Source: DESE Core Data and MAP Data, 1999–2000*  
 Missouri elementary schools were ranked according to their average MAP scores for mathematics (4th grade), science (3rd grade), and communication arts (3rd grade). The list of schools was then divided into the lowest-performing schools (lowest 25%), average-performing schools (middle 50%), and the highest-performing schools (top 25%). The average percent Hispanic students in a school is shown for each subject area.

**Figure B.3.**

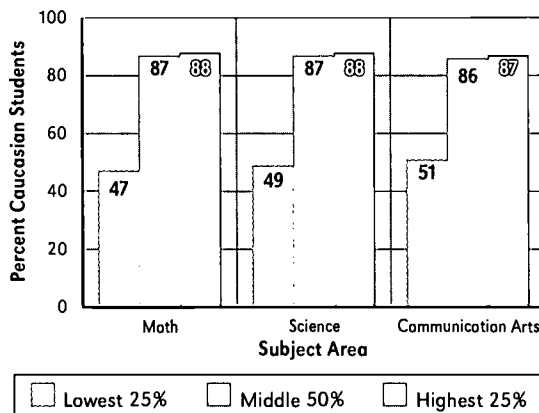
**Percent Asian-American Students by School Performance Quartile on 3rd and 4th Grade MAP Tests**



*Source: DESE Core Data and MAP Data, 1999–2000*  
 Missouri elementary schools were ranked according to their average MAP scores for mathematics (4th grade), science (3rd grade), and communication arts (3rd grade). The list of schools was then divided into the lowest-performing schools (lowest 25%), average-performing schools (middle 50%), and the highest-performing schools (top 25%). The average percent Asian students in a school is shown for each subject area.

**Figure B.4.**

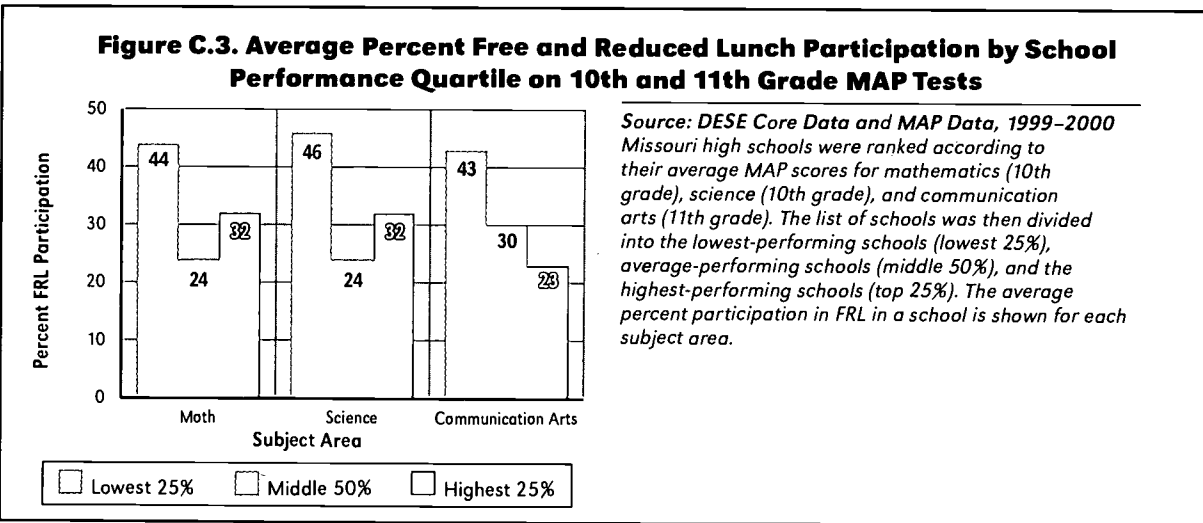
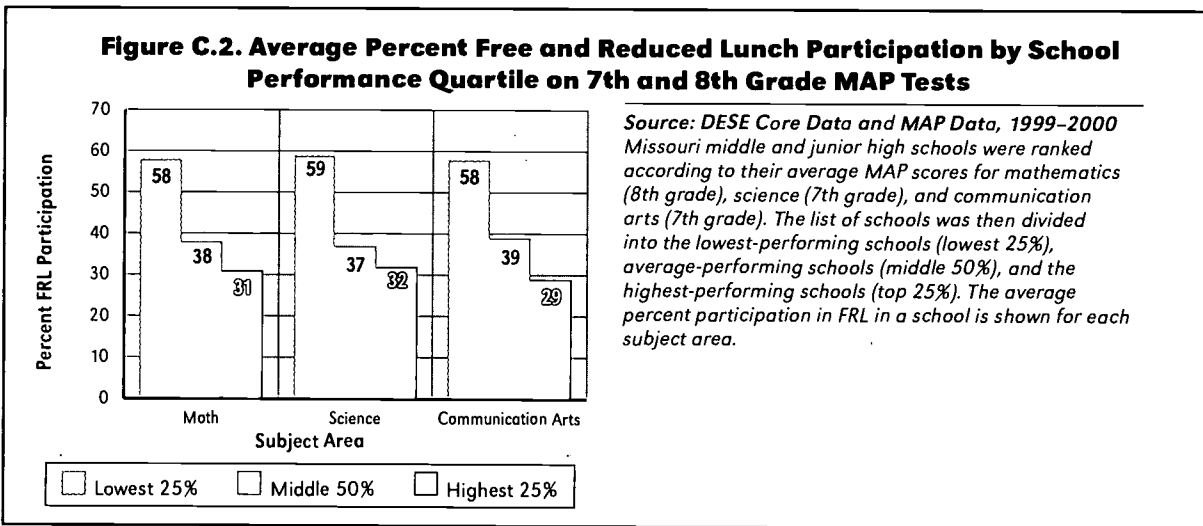
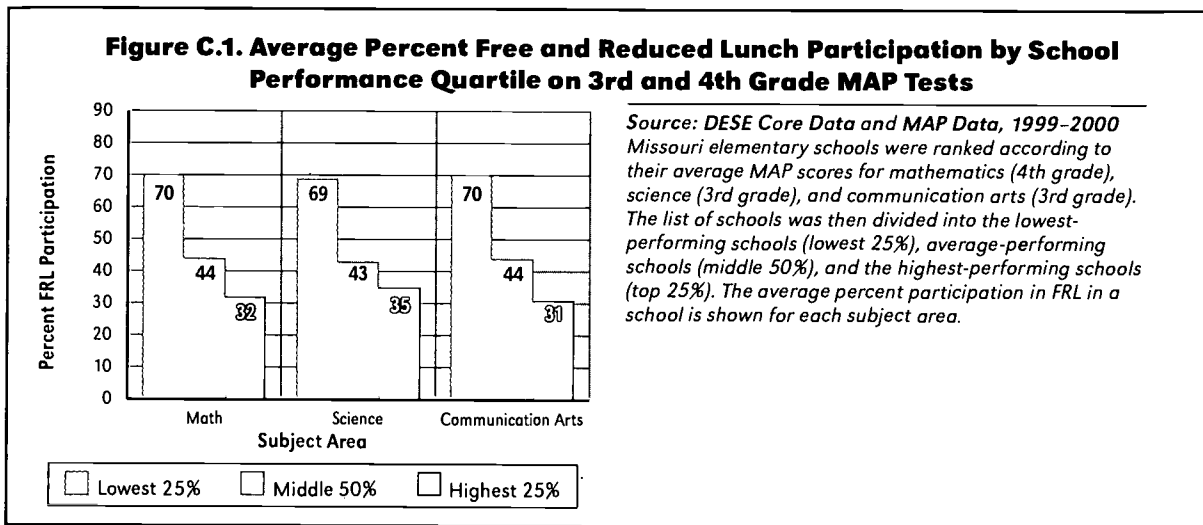
**Percent Caucasian Students by School Performance Quartile on 3rd and 4th Grade MAP Tests**



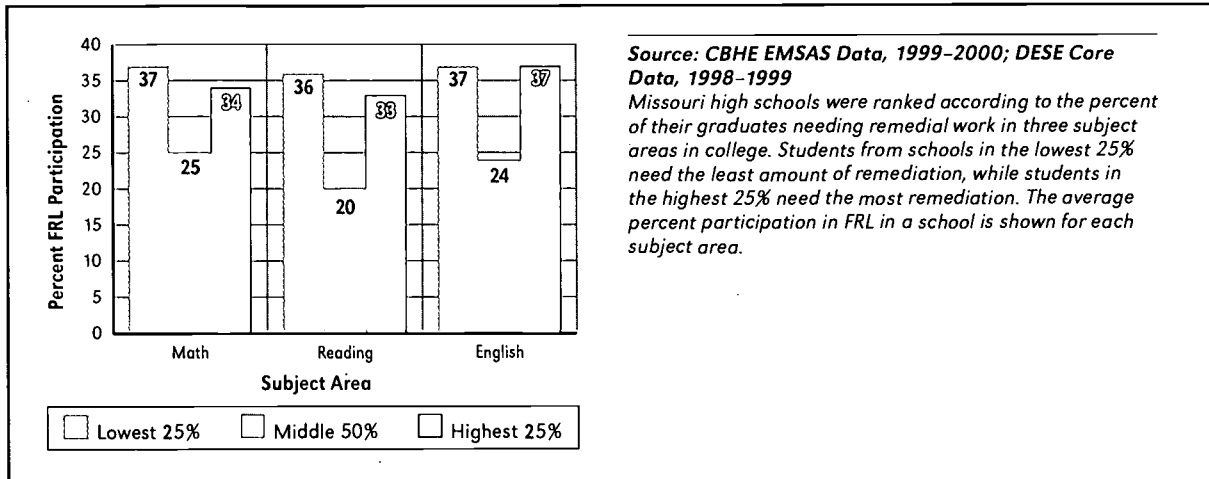
*Source: DESE Core Data and MAP Data, 1999–2000*  
 Missouri elementary schools were ranked according to their average MAP scores for mathematics (4th grade), science (3rd grade), and communication arts (3rd grade). The list of schools was then divided into the lowest-performing schools (lowest 25%), average-performing schools (middle 50%), and the highest-performing schools (top 25%). The average percent Caucasian students in a school is shown for each subject area.



### Appendix C: Percent Free and Reduced Lunch Participation by School Performance Quartile on MAP Tests



### Appendix D: Average Percent Free and Reduced Lunch Participation and the Need for Remedial Work in College



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**Appendix E: Teacher ACT Scores, 1998–1999 and 1999–2000**

**Table E.1. Distribution of New Graduates Entering Teaching Versus Other Fields by ACT Score**

ACT Score Range	Male			Female		
	Elementary Teachers	Secondary Teachers	Nan-Teachers	Elementary Teachers	Secondary Teachers	Nan-Teachers
15 or lower	3.4%	1.2%	1.6%	2.5%	1.1%	1.8%
16–19	30.3%	12.5%	16.9%	20.7%	15.1%	17.5%
20–23	39.5%	42.6%	30.9%	50.5%	42.9%	34.6%
24–27	21.0%	28.9%	27.6%	20.8%	25.6%	28.8%
28 or higher	5.9%	14.8%	23.0%	5.5%	15.3%	17.4%
Average ACT	21.5	23.4	23.8	21.8	23.1	23.3

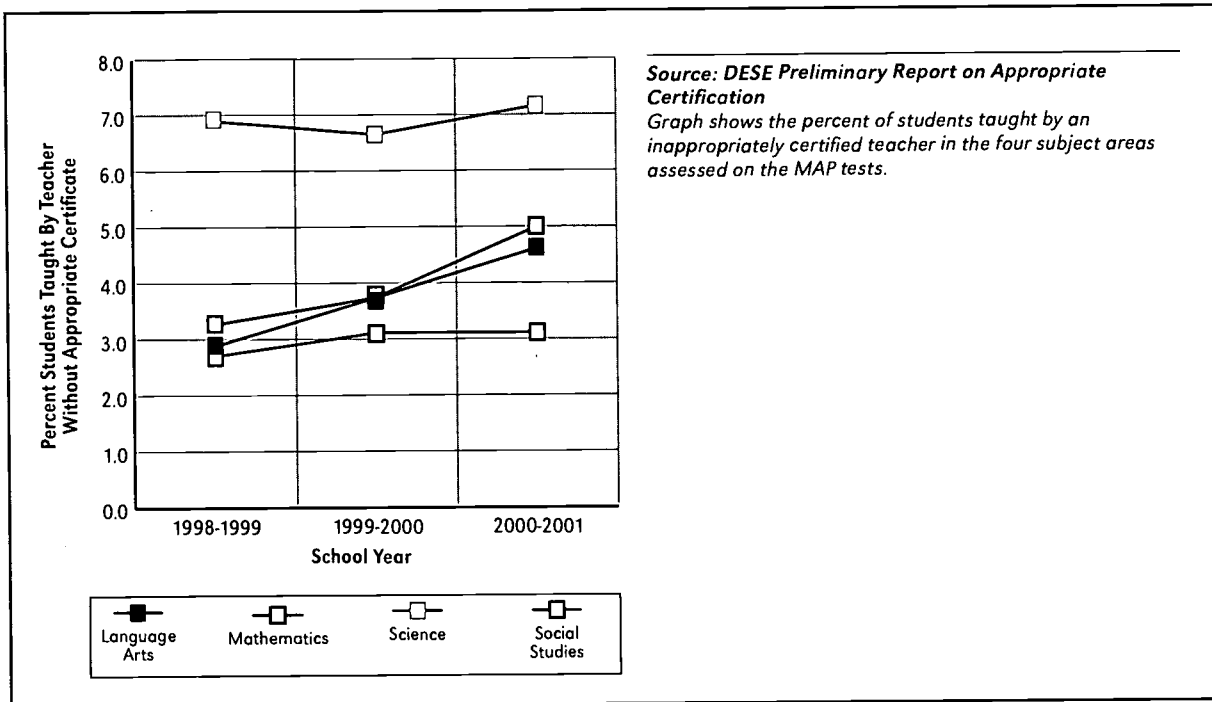
Source: ACT Data, DESE Core Data, CBHE EMSAS Data

**Table E.2. Distribution of 1998–1999 and 1999–2000 New Teachers in Major Metropolitan Areas and Rest of State by ACT Score**

ACT Score Range	Male			Female		
	Kansas City	St. Louis	Rest of Missouri	Kansas City	St. Louis	Rest of Missouri
15 or lower	6.3%	11.7%	3.5%	9.9%	14.0%	2.7%
16–19	28.1%	28.6%	21.0%	23.0%	34.7%	20.1%
20–23	37.5%	29.9%	41.1%	47.4%	38.1%	45.8%
24–27	25.0%	23.4%	23.7%	15.8%	11.4%	23.4%
28 or higher	3.1%	6.5%	10.7%	3.9%	1.7%	8.0%

Source: ACT Data, DESE Core Data, CBHE EMSAS Data

### Appendix F: Appropriate Subject-Area Certification Among Missouri Public School Teachers



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