

III TEACHER ATTRITION AND TEACHER DIVERSITY IN COLORADO

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TEACHER ATTRITION

Important research confirms that teacher attrition is costly to schools and districts in two important ways. First, Ingersoll (2001) has argued that teacher attrition negatively affects school community and school improvement efforts. School community is essential to building a professional community focused on improvement of student learning. Attrition disrupts the formation and cohesion of these communities. Second, several other research reports have shown that it costs approximately \$10,000 to hire a new teacher in terms of time, actual expenditures and training through the first year (Milanowski & Odden, 2007; Barnes, Crowe & Schaefer, 2007; Reichardt, 2006). These costs include the time used to recruit, hire and support teachers through their first year. This means that over \$70 million dollars in resources were used to replace the 7,224 the teachers who left Colorado districts in 2005. Finally, attrition is linked to the teacher gap. When teachers leave, they are often replaced with less qualified teachers. In Colorado, schools with higher proportion of minority students have higher attrition. The end result is that schools with high minority populations have fewer qualified teachers.

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It should be noted, however, that some attrition may be beneficial for a school. There are teachers who are simply not effective and should be encouraged to pursue other careers. For example, districts may remove teachers during their probationary period, which is usually during their first three years. However, once the probationary period is over, it is more difficult to remove a teacher. If a teacher reaches his/her third year, the district must choose whether to retain that teacher or to pursue a new teacher. Some attrition, especially that due to retirements, is also natural and can often be predicted by districts.

Attrition is defined as a person who worked in a school (or district) the prior year and is not working at that same school (or district) in the next year. This section reports on both district and school attrition. District attrition measures the number of teachers who moved to another district, a different profession, or are no longer working. School level attrition measures the number of teachers who left a school, including those teachers who transferred to other schools within a district. The attrition data are based on information reported by the Colorado Department of Education (CDE). School level attrition data (from the school accountability reports, SARs) and district level information can be found on the Colorado Department of Education website¹⁵.

Attrition Factors

The education research literature has identified many factors associated with teacher attrition. These can include environmental factors that are outside of a district or school's control such as the state of the economy and opportunities for employment outside of education. Data collected by the federal government suggests life events (e.g. marriage, pregnancy, spouse's job transfers) are the primary reason

¹⁵http://www.cde.state.co.us/index_home.htm

teachers leave their job (Luekens, Lyter & Fox, 2004). Attrition is also related to a teacher's life trajectory; attrition is higher at the beginning and end of teachers' careers, with lower attrition as they settle into the middle of their working lives as teachers (Reichardt 2001; Kirby, Grissmer & Hudson, 1991).

While teacher attrition can be linked with factors outside school and district control, it is increasingly clear that certain school level factors which are very important to teacher attrition, such as working conditions, mentoring and salary, are under policymakers' control (Reichardt et. al, in press; Hirsch, Emerick, Church & Fuller, 2006; Hanushek, Kain & Rivkin , 2001; Guarino, Santibanez, Daley & Brewer, 2004). Finally, some districts may have higher attrition because they remove teachers who do not meet local high expectations for teacher performance.

Attrition in Colorado

The statewide average district attrition rate has varied between 1998 and 2004 ranging from 14.4% to 16.5%¹⁶. Table 1 provides information on the number of teachers working in Colorado and their attrition rate from 1998 through 2004. Year indicates the last year a teacher worked. In other words, there were 7,724 teachers who worked in Colorado districts in 2004 and did not return to those same districts in 2005. These teachers may have gone to work in other districts, taken non-education jobs, taken a year off, or stopped working altogether. The table also shows that the number of teachers in Colorado has increased by 6,264 between 1998 and 2004, with the growth leveling off after 2002.

Year	Number of Teachers	Teachers Who Left Their Districts	Statewide Average Attrition Rate
1998-99	40,421	5,936	14.7%
1999-00	41,821	6,783	16.2%
2000-01	43,080	7,031	16.3%
2001-02	45,313	6,516	14.4%
2002-03	46,667	6,716	14.4%
2003-04	46,480	7,478	16.1%
2004-05	46,685	7,724	16.5%

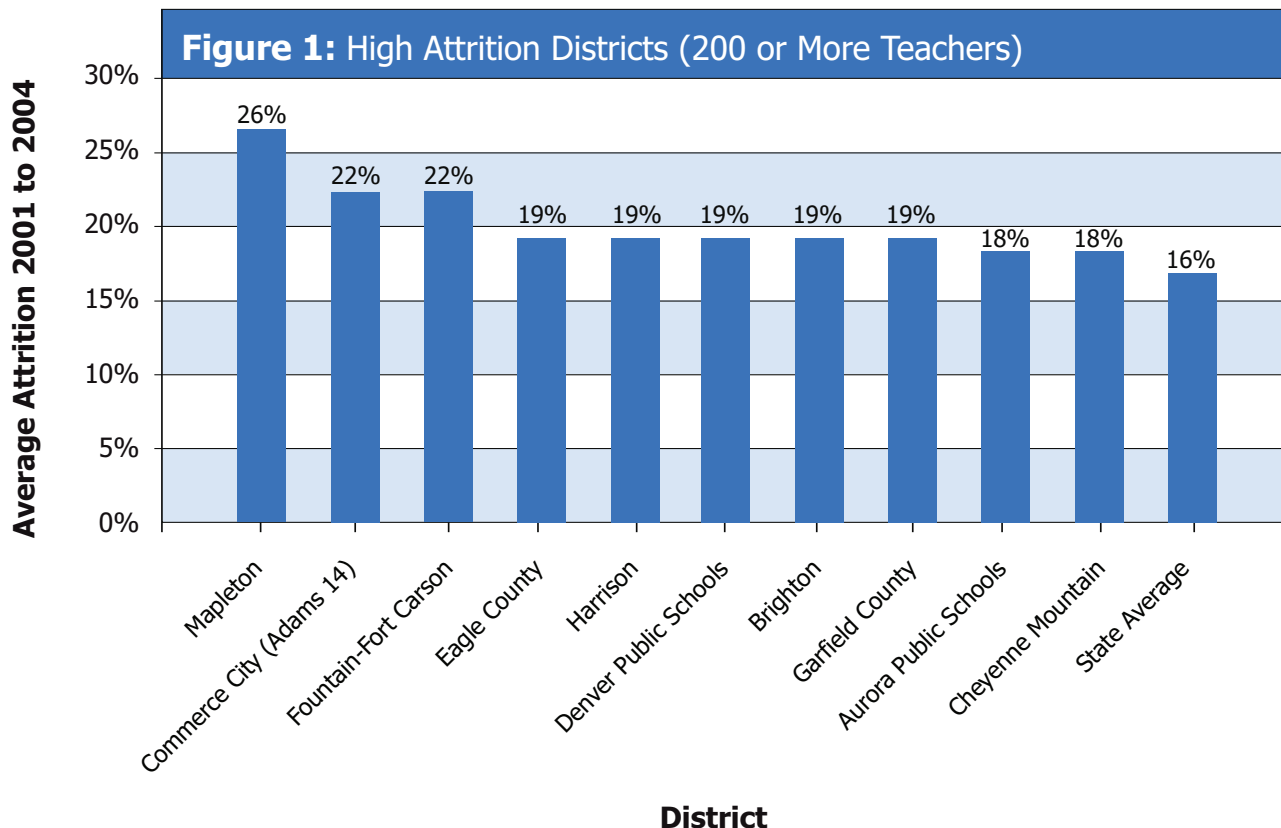
Source: CDE

¹⁶National data reports an average school level attrition rate of 15%. By definition, school level attrition rates are higher than the district rates reported here (Luekens, et al., 2004). As is reported below, the Colorado school level attrition rate was 22% in 2005. This suggests, but does not confirm, that attrition rates may be higher in Colorado than the rest of the nation.

District Levels of Attrition

This section identifies districts with high and low average attrition between 2001 and 2004. This uses the latest available CDE data on turnover of professionals at the district level available on the CDE website¹⁷. In order to identify districts with consistently higher or lower attrition, the attrition rates are averaged over four years (2001-2004). The attrition rate for smaller districts can vary greatly, because a small number of people leaving a district can lead to large attrition rate. To avoid this misleading variance, the following analysis focuses on districts with 200 or more teachers in 2005. These 39 districts employ 85% of the teachers in the state. The smallest districts included in this analysis are Fort Morgan and Windsor; each employed 217 teachers in 2005.

Source: CDE



As shown in Figure 1, high attrition districts are found throughout the state and include both urban and rural parts of the state. High attrition districts include the relatively rural Eagle County and Garfield County. Table 2 below shows the 10 districts with the highest average attrition for the most recent four years that data are available. The average attrition rate for districts with 200 or more teachers between 2001 and 2004 was 16%.¹⁸ Most of the high attrition districts have attrition rates that are fairly close to the state average (i.e. three or fewer percentage points above the state average). However, three districts had attrition rates of over 20%: Mapleton, Commerce City (Adams 14), and Fountain. What is not clear from these data is the cause of these differences. What is important is that policymakers and practitioners investigate whether high levels of attrition are a barrier to improved student learning and what measures can be used to address the root causes of attrition.

¹⁷The turnover data is located at: http://www.cde.state.co.us/index_stats.htm.

¹⁸Note that this average is slightly different than what is shown on Table 1. On Table 1, the average attrition rate is essentially a state average; derived by averaging the total number of teachers who left their districts divided by the total number of teachers in the state. In this section the average is created by averaging each of the 39 district's attrition rates.

Table 2 also shows the additional cost due to replacing teachers when attrition is higher than the state average. These costs are based on the assumption that it costs \$10,000 to replace a teacher and that all teachers are replaced (i.e., a district is not shrinking in enrollment). In other words, the table shows how much more each district spends than it would if its attrition were at the state average of 16%. Costs are higher in larger districts, i.e. those with more teachers. The higher attrition districts of Denver County, Aurora, and Mapleton have the highest costs associated with teacher attrition. The resources used for replacement are considerable, but only a small part of district expenditures. In 2005, total expenditures in Mapleton were \$43 million and over \$634 million in Denver Public Schools (based on 2006 School Accountability Report).

	Number of Teachers (2004)	Average Attrition 2001 to 2004	Cost for teacher replacement due to higher than average attrition
State average		16%	
Mapleton	292	26%	\$292,000
Commerce City (Adams 14)	417	22%	\$250,200
Fountain-Fort Carson	360	22%	\$216,000
Eagle County	409	19%	\$122,700
Harrison	792	19%	\$237,600
Denver Public Schools	4044	19%	\$1,213,200
Brighton	545	19%	\$163,500
Garfield County	237	19%	\$71,100
Aurora Public Schools	1818	18%	\$363,600
Cheyenne Mountain	281	18%	\$56,200

Source: CDE

At the same time, some districts have lower than average attrition. Table 3 shows the 10 districts with the lowest average teacher attrition between 2001 and 2004 and how much each district saved by having an attrition rate that is below the state average (16%). Here again, low attrition districts are spread throughout the state. Cherry Creek, Douglas County and Grand Junction had the most resources available for other activities by having a lower than average attrition rate.

Table 3: Districts with Low Levels of Attrition			
	Number of Teachers (2004)	Average Attrition 2001 to 2004	Lower costs for teacher replacement due to lower than average attrition
State average		16%	
Poudre	1585	13%	\$475,500
Montrose County	379	13%	\$113,700
Canon City	250	13%	\$75,000
Windsor	217	13%	\$65,100
Douglas County	2736	13%	\$820,800
Durango	335	13%	\$100,500
Cherry Creek	2999	13%	\$899,700
Greeley 6	1127	12%	\$450,800
Pueblo City	1076	12%	\$430,400
Grand Junction	1237	10%	\$742,200

Source: CDE

As shown above, there are districts throughout the state that consistently have higher or lower rates of teacher attrition. The difference between the high and low attrition districts is between 6 and 16 percentage points. There are many potential causes of these differences. The data in the next several sections discuss factors that are associated with higher and lower attrition: the age of teachers working in a district; the salary incentives for transfer between districts; and school level factors. The final section uses a statistical technique (multiple regression) to identify the magnitude of some school level factors associated with attrition. Taken together, this information should help direct inquiry and action at the state and local level to identify and address issues that may be barriers to attracting and keeping high quality teachers in the classroom.

Districts and Teacher Age Profiles

The likelihood that a teacher will leave a school or district changes as a teacher moves through his/her career. Research has shown that teachers at the beginning and end of their careers are more likely to leave a district. Younger teachers may leave as they search out places they prefer to live, schools where they prefer to work, or different careers. Older teachers leave when they retire.

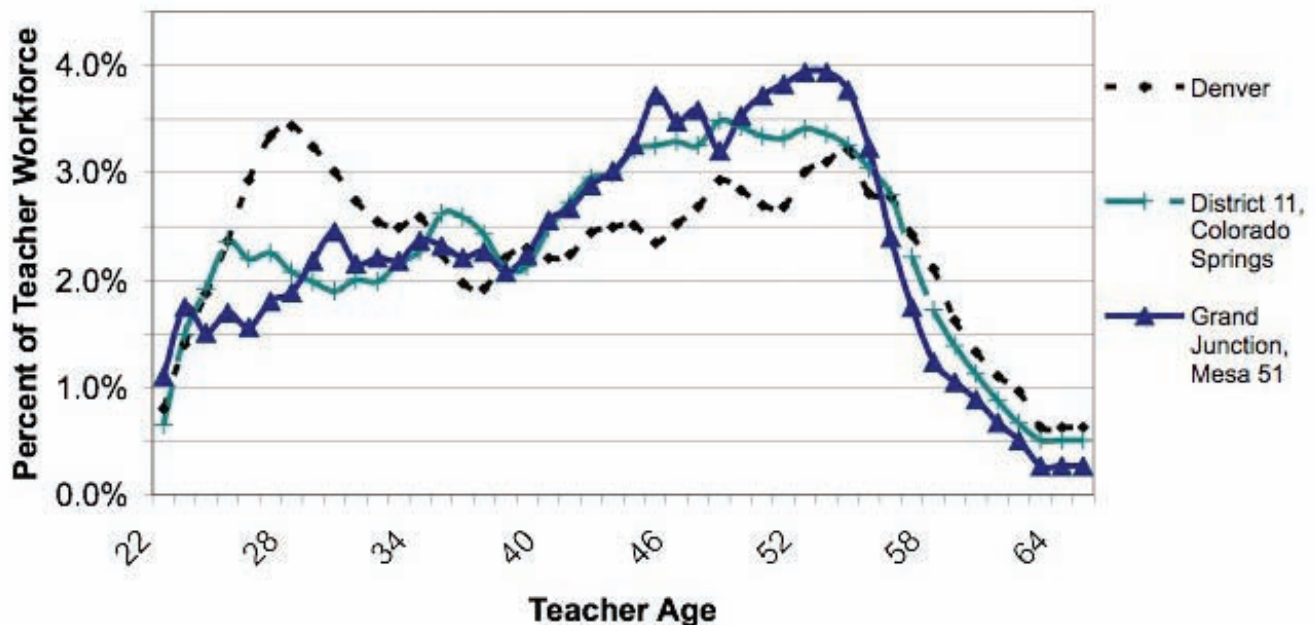
Generally, as teachers approach 55 years old their probability of leaving the teaching profession greatly increases. This is partially due to retirement incentives in the teacher retirement system. Because most teacher retirement systems provide a defined benefit, i.e., a retiree gets the same pre-defined benefit for the rest of his/her life, there is an incentive to retire as soon as a person qualifies. Every year a person works after qualifying for retirement is a year that the person does not receive those benefits. Under PERA (Public Employees Retirement Association), the retirement system for Colorado public teachers (outside of

Denver), a teacher can retire at 55 if s/he has worked for 25 years. The average age for retirement of a person in PERA (includes police, fire and other public employees) is 58 (Colorado Public Employees Retirement Association, 2007). Denver teachers have a separate retirement system: Denver Public Schools Retirement System, which has similar retirement rules to PERA¹⁹.

This analysis focuses on the 12 largest districts in Colorado, those with more than 1,200 teachers. These districts employ about 58% of all teachers in Colorado and their larger size illustrates the different age distributions in Colorado districts. Age distributions are simply a description of the age of teachers in these districts.

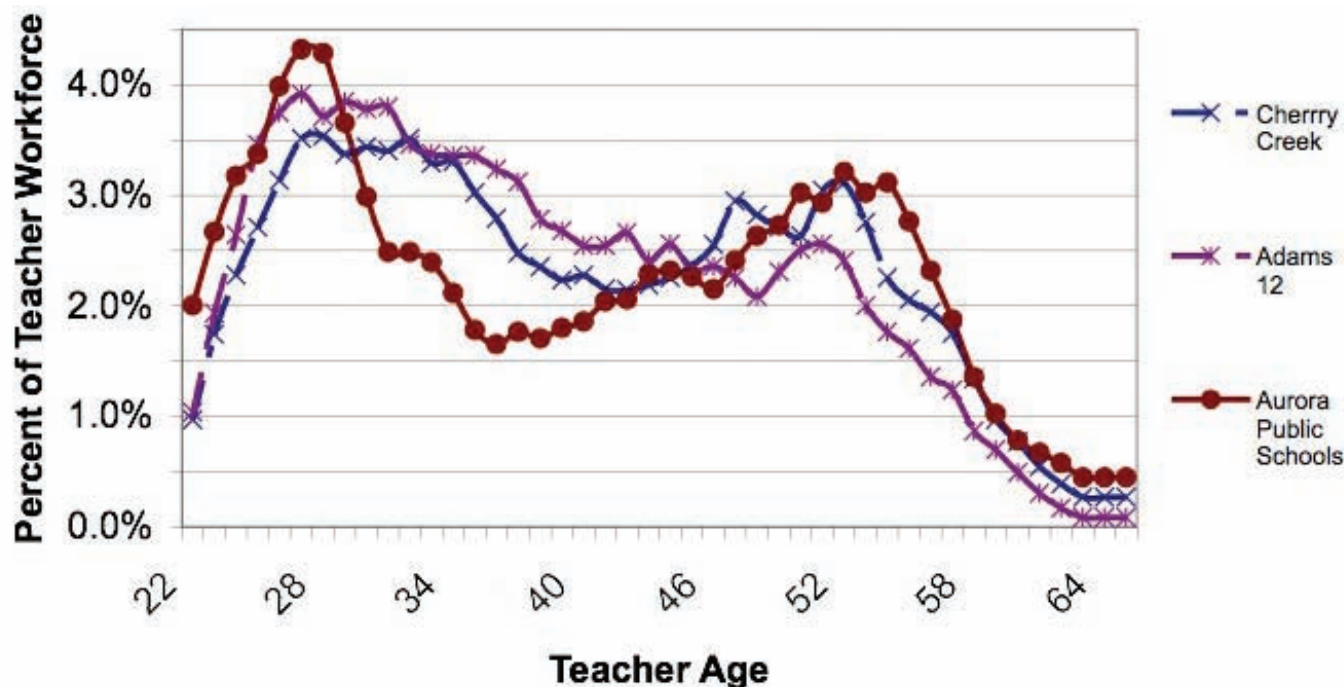
Figure 2 shows the teacher age distribution of the three large districts with the largest proportion of teachers over 50 years old. These districts are Denver, Colorado Springs District 11, and Grand Junction. In each of these districts about 1 out of 6 teachers is 55 years old or older. These districts should expect high current or near future levels of attrition due to retirement. Denver is experiencing high levels of attrition as is noted above. Grand Junction should expect increasing attrition in the future. Colorado Springs District 11 has near average current attrition, but may see increased attrition over the near future. As these larger cohorts of experienced and generally higher paid teachers retire, the districts may experience short term decreases in salary expenses. When a teacher retires, the district does not pay the retirement costs. The expense of paying the retirement pension is shifted to PERA.

Figure 2: Districts with Largest Proportion of Teachers over 50 Years Old (of largest 12)



On the other end, some districts with relatively high numbers of younger teachers can expect increasing salary expenses as these teachers age. Figure 3 shows the age distribution of three of the largest districts with the largest proportion teachers under 35. The effect on attrition may be mixed. One of these districts, Cherry Creek, has relatively low levels of attrition. While newer teachers have generally higher attrition, as this younger cohort ages into their 30s its attrition levels should be expected to decrease.

¹⁹A study of the Denver Public School Retirement System was released in March 2008 by the Donnell-Kay and Piton Foundations: <http://www.dkfoundation.org/PDF/DPSPensions-Report-3-17-08.pdf>

Figure 3: Districts with Largest Proportions of Teachers under 35 (of largest 12)

Taken together, this analysis makes clear that districts have very different workforces in terms of age profiles. These differences affect the expected attrition for districts, salary expenditures, and experience level of classroom teachers.

Finally, it should be noted that two of the higher attrition districts: Aurora and Denver, have relatively large numbers of both younger and older teachers. Their age distributions in Figures 2 and 3, show U-shaped age distributions with higher proportions of both younger and older teachers. These districts have good reasons to expect higher levels of attrition for the next few years as the older cohorts of teachers retire. They may face challenges in attaining lower levels of attrition unless they are able to retain high numbers of young teachers as they age into their 30s when teachers are less likely to leave their jobs.

Salary Factors

Salaries, like age, are a factor associated with attrition. Teachers are responsive to salary incentives, and higher salaries are associated with lower attrition (Guarino et al., 2004). In order to get a better understanding of salary incentives in the Denver and Colorado Springs metro areas, this section analyzes salary differences between districts in these regions. The average salary paid by districts at three different points in teacher careers was calculated: No experience and a bachelor's degree, 5 years experience and a master's degree, and 10 years experience and a master's degree. These three points were selected to maximize the number of salaries that could be used for the calculations.

Each district determines how many years of experience it will accept in calculating a new hire's salary level. Districts must balance their ability to attract experienced teachers (who are generally more effective as was noted earlier) and the higher salary expenses for those experienced teachers. Although there are districts where as many as 10 years of experience or more are accepted, most districts accept 3-5 years of experience when calculating the salary of new hires, regardless of how much experience the teacher

actually brings into the district. In essence, this is a factor that may affect a teacher's decision to remain in a district once they have more than five years of experience.

This analysis looks at Denver metro area districts in Adams, Arapahoe, Denver, Douglas, Boulder and Jefferson counties. Note that in-state education experience is used for the analysis based on an assumption that out-of-state experience is not used by districts in calculating salaries²⁰. Table 4 shows the difference between the average district salary and the average for the metro area districts at that education and experience level. The overall average for the region is shown at the top; salaries that are below the average are shown in parenthesis.

Table 4: Difference between Salary and Regional Average at Three Age and Experience Levels, Denver Metro Area, 2005			
	Bachelors - No Experience	Masters - 5 Years Experience	Masters - 10 Years Experience
Average	\$33,644	\$48,209	\$56,670
Mapleton	(\$1,598)	(\$1,689)	*
Commerce City	\$952	(\$2,939)	*
Brighton	(\$1,041)	(\$17)	*
Westminster**	(\$6,761)	(\$2,778)	(\$7,555)
Englewood	*	\$3,351	(\$1,388)
Cherry Creek	*	\$2,668	\$3,844
Littleton	\$1,317	(\$1,877)	(\$1,776)
Aurora Public Schools	\$1,680	(\$1,471)	\$565
St. Vrain	\$2,861	(\$3,020)	(\$4,303)
Boulder Valley	\$662	\$2,558	(\$1,390)
Denver	\$733	(\$4,329)	(\$485)
Douglas County	\$1,135	\$1,301	(\$1,476)
Jefferson County	(\$2,821)	\$293	\$656

Source: CDE HR Data

* Districts with less than 3 people in a cell are not shown. Smaller districts in the Denver Metro Area not shown.

**Table does not reflect recent changes to Westminster teacher pay system.

²⁰The state HR data used for this analysis contains information on number of years experience teaching in Colorado and experience teaching outside of Colorado. Only the data on experience working in Colorado is used here. The HR data does not have information on how districts used this experience to calculate an individual teacher's pay.

The table makes clear that teachers with similar education and experience levels may make significantly less depending on where the teacher works. In 2005-06, the average teacher with minimal experience and education (zero experience and a bachelor's) was paid \$5,682 per year **more** in St. Vrain than in Jefferson County (\$5,682=\$2,821+\$2,861). A teacher further in his or her career with 10 years experience and a master's degree would make \$8,147 per year **less** in St. Vrain than s/he would make in Cherry Creek. St. Vrain's salary schedule clearly provides incentives for new teachers to work in the district. There are also incentives for more senior teachers in St. Vrain to consider opportunities in other districts.

These differences in pay provide different incentives for teachers depending on how long a teacher plans to work in the profession. One who expects to work in teaching for a long time may accept lower initial pay in exchange for higher pay in the long run that is associated with higher lifetime earnings. At the same time, a teacher who is not planning to teach for a long time or has not settled on a final location to work/live may look for higher initial salary.

It is important to note that since the data were collected for this report, Westminster (Adams 50) School District initiated a major change in its teacher pay system effective in 2007-08. In the new pay system, teachers new to the district start at a salary of \$40,000. As a result, other districts are considering or have made changes to their pay systems. It is too early to determine the impact of this new pay system on attracting and retaining teachers in Westminster and/or the impact on surrounding districts. This will be an important initiative to observe in coming years.

There is a correlation between lower salaries and higher attrition. Those districts with lower than average salaries have higher attrition than those with higher than average salaries. The size of the difference depends on which education experience level is used. For example, those districts with lower than



average salaries for bachelor's degree with no experience had an average attrition rate of 21% in 2004, compared to 18% for those districts with a higher than average salary. It must be noted that without more data on individual teacher attrition, it is impossible to say that differences in salaries caused the lower or higher attrition.

A similar analysis of differences in salaries in El Paso County (Colorado Springs and vicinity) is shown in Table 5. Here again, there are significant differences between districts. Two districts, Colorado Springs District 11 and Lewis-Palmer, have generally higher salaries than other districts. At the same time, Widefield and Academy 20, appear to generally have lower salaries. As with the Denver Metro region, those districts with higher than average salaries have lower attrition. For example, the average attrition rate for those districts with higher than average salaries for teachers with a master's degree and five years experience is 17% compared to 19% for districts with lower than average salaries.

Table 5: Difference between Salary and Regional Average at Three Age and Experience Levels, El Paso County, 2005

	Bachelors - No Experience	Masters - 5 Years Experience	Masters - 10 Years Experience
Average	\$32,263	\$42,971	\$47,404
Calhan	*	*	\$(8,679)
Harrison	\$382	\$(2,849)	\$(3,522)
Widefield	\$(404)	\$(1,565)	\$(1,137)
Fountain-Fort Carson	\$(600)	\$179	\$(1,654)
Colorado Springs 11	\$488	\$3,595	\$3,520
Cheyenne Mountain	*	*	\$32
Manitou Springs	\$(1,482)	*	\$(6,888)
Academy 20	\$(1,851)	\$(1,646)	\$(2,487)
Ellicott	\$(4,674)	*	*
Lewis-Palmer	\$283	\$445	\$425
Falcon	\$135	\$(407)	\$(1,130)
Miami/Yoder	\$(1,072)	*	*

* Districts with less than 3 people in a cell are not shown. Smaller districts in El Paso County not shown

Many issues should come into consideration when constructing salary schedules including the experience and education level a district wants to attract, the age and experience level of teachers interested in working in a given district, and the trade off between hiring more relatively low paid teachers or fewer high paid teachers. The point of this analysis is to highlight the importance of analyzing regional differences in salary schedules that may affect where teachers choose to work at different points in their careers.

Finally, as further illustration of these differences in salary, Appendix 2 includes maps showing the differences in salary for Denver metro and El Paso County districts.

Overall Factors Affecting Teacher Attrition

A key question is how different factors (e.g. age, performance, school size) are related to teacher attrition. The statistical analysis shown in Table 6 attempts to separate the relationship of different school level factors²¹ with attrition. It must be noted that these factors are not assumed to cause changes in teacher attrition, but on average they are correlated or associated with differences in teacher attrition.

Number of schools	1439
r-squared	.15
Average school attrition (with controls)	19%
Increase in attrition associated with 10% higher minority enrollment	.6%
Increase in attrition associated with a school with 100 fewer students	.03%
Increase in attrition associated with 10% decrease in enrollment from 04 to 05	1.9%
Increase in attrition associated with 10% more teachers over the age of 55	.9%
Increase in attrition associated with 10% more novice teachers (in their first 3 years of working)	1.7%
Difference in attrition unsatisfactory school performance compared to excellent	14%
Increase in attrition excellent school rating compared to average	3%

Other controls are not reported because they are not significant: elementary school, middle school (high school is reference variable), Low performance, high performance (excellent is reference)

The results in Table 6 come from using a multiple regression technique on teacher attrition data from the SAR (School Accountability Report) combined with data on student enrollment and teacher characteristics from Colorado Department of Education (CDE). A total of 1,439 schools were used in the regression. Not all schools in the state are included because some were missing data, mostly around student performance.²²

A school with the average of all the factors used in the analysis has an attrition rate of 19%. This is a bit of a statistical artifact, since it is impossible for a school to be average for all the factors used in the table. The analysis suggests that on average if two schools are exactly the same regarding the other controls in this table, but one has 10% more minority students, teacher attrition in that school will be higher by less than 1 percentage point. In terms of the typical Colorado school with 30 teachers, it means that the school with 10% more minority students would lose one more teacher every 3 to 4 years.

²¹These factors are combined in Figure 4 and therefore cannot be directly compared to those in Table 6.

²²The factors listed in the table below the "r-squared" are the coefficients in the regression. The coefficients shown are all significant at the 5% level, which means there is at least a 1 in 20 chance that actual number is 0 (which means there is a 1 in 20 chance that changes shown in the table occurred randomly). The r-squared shows the proportion of the differences in attrition between schools that is accounted for with all of the different factors in the regression. In this case, the r-squared is .15. This suggests that a large majority (85%) of school attrition is not associated with the factors (variables) listed here.

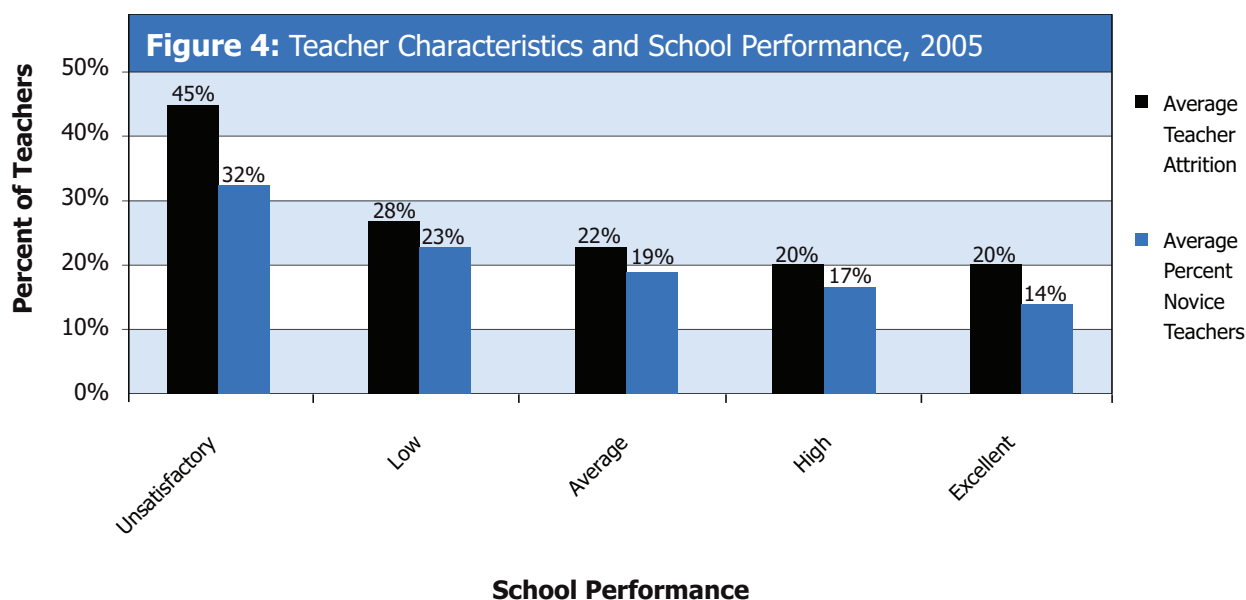
Although larger schools generally have lower attrition rates, the decrease in attrition associated with enrollment of 100 more students is less than half a percentage point. The analysis shows that schools that are growing have lower attrition; those that are shrinking have higher attrition. Data cannot differentiate between a teacher who left for personal reasons and one who had to leave because of lower enrollment.

Attrition also appears to be associated with the school performance levels determined by CDE using data from the Colorado Student Assessment Program (CSAP). Schools are rated as either unsatisfactory, low, average, high and excellent. The relatively high attrition rates in the unsatisfactory schools appears to be associated with both the high numbers of novice (younger) teachers, as discussed earlier, and the school performance, when controlling for other factors such as student demographics. Attrition in low, high and excellent performing schools is statistically the same when controlling for other factors such as teacher demographics. This suggests that high attrition in low rated schools is driven by the high number of novice teachers in those schools. It is interesting to note that compared to an excellent school, average schools have lower attrition. This suggests that excellent schools also face challenges in retaining teachers, although not as significant as challenges faced by unsatisfactory schools.

Teacher Attrition and Student Performance

As highlighted above, attrition is higher in lower performing schools. While Ingersoll (2001) has argued that higher attrition can cause lower performance, this analysis does not clarify whether low performance causes higher attrition or higher attrition causes lower performance. However, if experienced teachers are replaced with inexperienced teachers, who are generally less effective at improving student achievement, then higher attrition could directly cause lower performance (Reichardt, 2001; Rice, 2003).

Figure 4 below shows average teacher attrition as well as percent of teachers in their first three years of teaching (novice teachers) by school performance.²³ The attrition shown is school level attrition (whether a teacher leaves a school) as compared to the district level attrition (whether a teacher leaves a district) shown above. The average school level attrition in 2005 was 22% compared to district level attrition of near 16%. School level attrition is expected to be higher than district attrition, because it includes teachers who move between schools within each district. Therefore, in Colorado, on average, 6% of school attrition is due to teachers moving to other positions within the district (16%= 22%-6%).



²³This analysis uses data from the 2006 School Accountability Report (SAR) and Human Resources Files from CDE.

Attrition is much higher in the lower performing schools. The attrition rate in an unsatisfactory performing school was more than double the attrition rate at an average performing school, and the attrition rate in a low performing school was six percentage points higher than an average performing school. In a low performing Colorado school with about 30 teachers, this translates to a loss of about two more teachers a year than an average performing school with the same number of teachers. Equally important, those lower performing schools have more novice teachers who, on average, are less effective than experienced teachers.

Implications for Teacher Attrition

High levels of teacher attrition have important negative impacts on student learning and take resources away from other vital activities within schools and districts. The analysis offers important messages for policymakers at the state, district and school level. Focusing attention on teacher retention in unsatisfactory and low performing schools should be a priority. These lower performing schools have higher levels of attrition and disproportionate numbers of inexperienced teachers.



This suggests two possible and complimentary responses. First is to modify assignment policies and incentives so that novice teachers are not placed in low performing schools. Requirements, such as section 1111(b)(8)(C) of NCLB's Title I which stipulates that poor and minority children should not be taught at a higher rate by inexperienced and out-of-field teachers, could be leveraged to support state policies. Second, the state and districts should work together to support these new teachers through enhanced induction and mentoring programs which research suggests can reduce new teacher attrition as was discussed in the prior section. As the Colorado Licensing Act already requires that districts provide new teachers with an induction program, the state should increase efforts around technical assistance, brokering of support, and dissemination of best practices. The state and districts should also prioritize resources for high needs schools to ensure high quality induction and mentoring in those schools.

The analysis also shows that districts differ in factors that affect retention: age profiles and salary incentives. These differences raise questions for district policymakers:

- What is the age profile of our district?
 - Should we expect higher levels of attrition due to retirements in the near future?
 - Do we have high proportions of younger teachers who may require additional instructional support and mentoring?
 - How will the aging of our workforce affect our salary expenses over the next five years?
- Does our salary schedule serve our needs for attracting and retaining the effective teachers needed in this district?
- Do our assignment policies or practices result in less experienced or less qualified teachers working in lower performing schools?
- Does our district's strategy for instructional improvement fit with the experience level of our teachers and the incentives in our salary schedule?

This analysis is aimed at encouraging school district leaders to learn more about their teacher workforce and to think strategically about how to best help that workforce meet the instructional and learning needs of their students.

Finally, it must be noted that much of this attrition analysis focused on Colorado's larger districts, while the majority of Colorado's districts are relatively small. Many of these small districts face challenges in retaining teachers as well due to a wide variety of factors including isolation, housing costs and availability, and competition from urban and suburban districts.

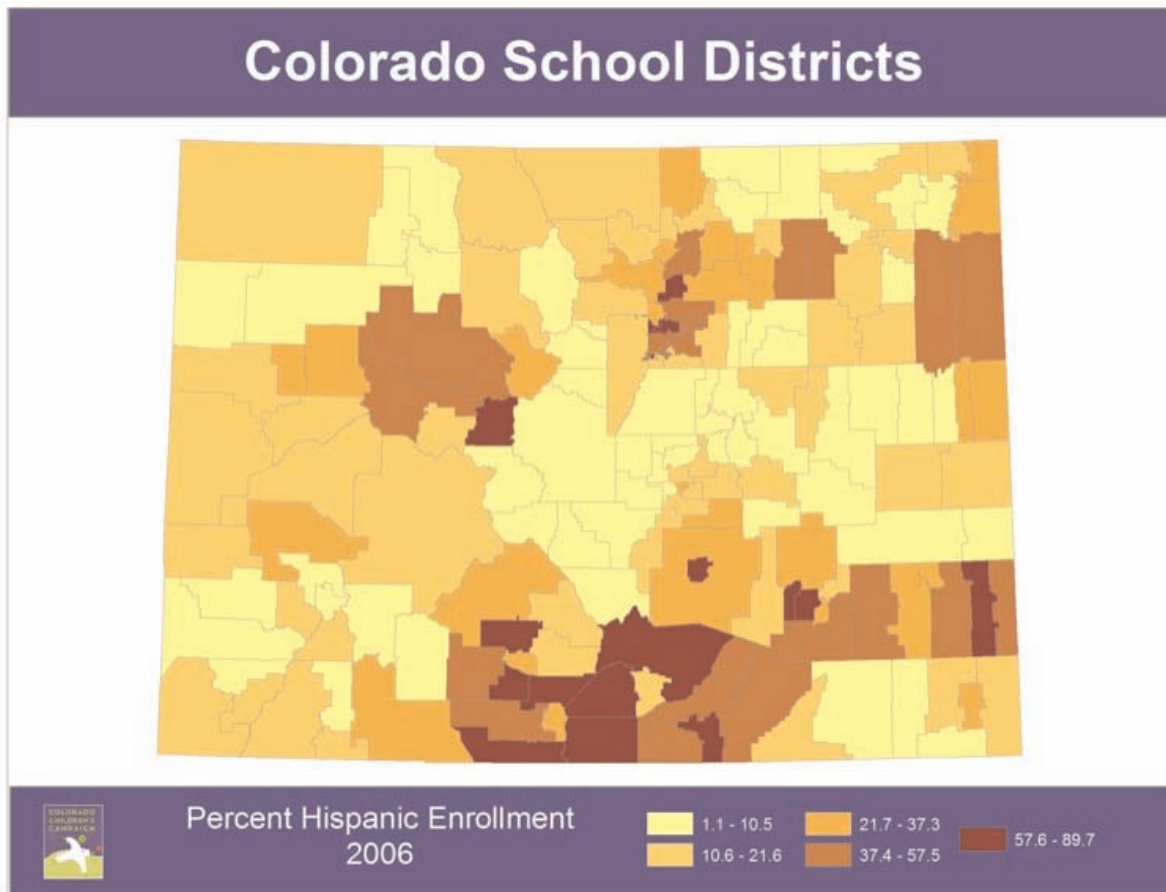
Further study that can accommodate the smaller numbers of teachers in smaller districts should be conducted.

TEACHER DIVERSITY

As was discussed in last year's *Shining the Light*, Colorado's student body is becoming more diverse. This is important for two reasons. As the student body becomes more diverse, teachers may need a wider set of skills to motivate and reach all students in the classroom. As was noted in the prior section this may be particularly true for teachers working with students and parents who are from diverse social, ethnic, racial and/or linguistic backgrounds. Second, recent research has suggested that students, on average, learn more from teachers of similar racial and ethnic background (See section on race and ethnicity in Teacher Quality Chapter, pages 17-20; Hanushek, Kain, O'Brien & Rifkin, 2005).

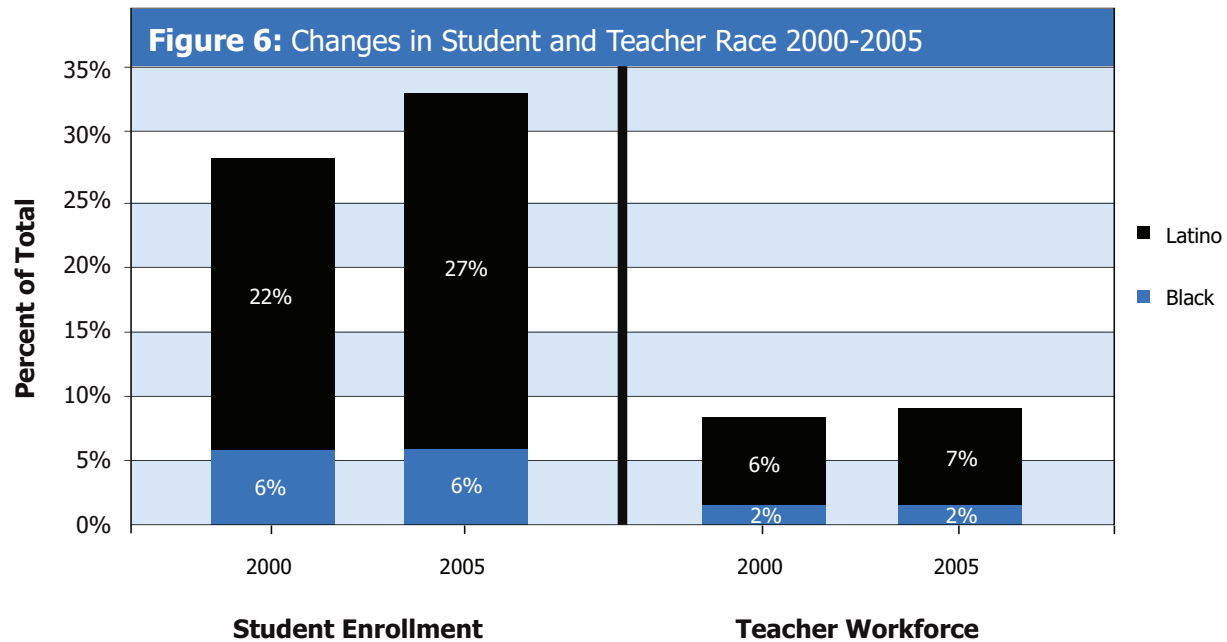
The map below provides one perspective of student ethnic diversity in Colorado.

Figure 5: Student Ethnicity in Colorado School Districts



Source: Colorado Department of Education as reported by Colorado Children's Campaign

Figure 6 below shows the changes in teacher and student diversity between 2000 and 2005. On the left side of the figure are the proportion of black and Latino students in 2000 and 2005. The proportion of black students remained steady at 6% of the state's student body. Over the same five year period, the proportion of Latino students increased by 5 percentage points from 22% to 27% of the student body. In other words, an average Colorado classroom of 20 students had one more Latino student in 2005 than it did in 2000. Over the same period the proportion of Latino teachers working in Colorado increased by one percentage point from 6% to 7%, while the proportion of black teachers remained steady at 2%. Taken together, the proportion of Latino teachers in Colorado is growing, but the proportion of Latino students is growing five times faster.



Source: CDE

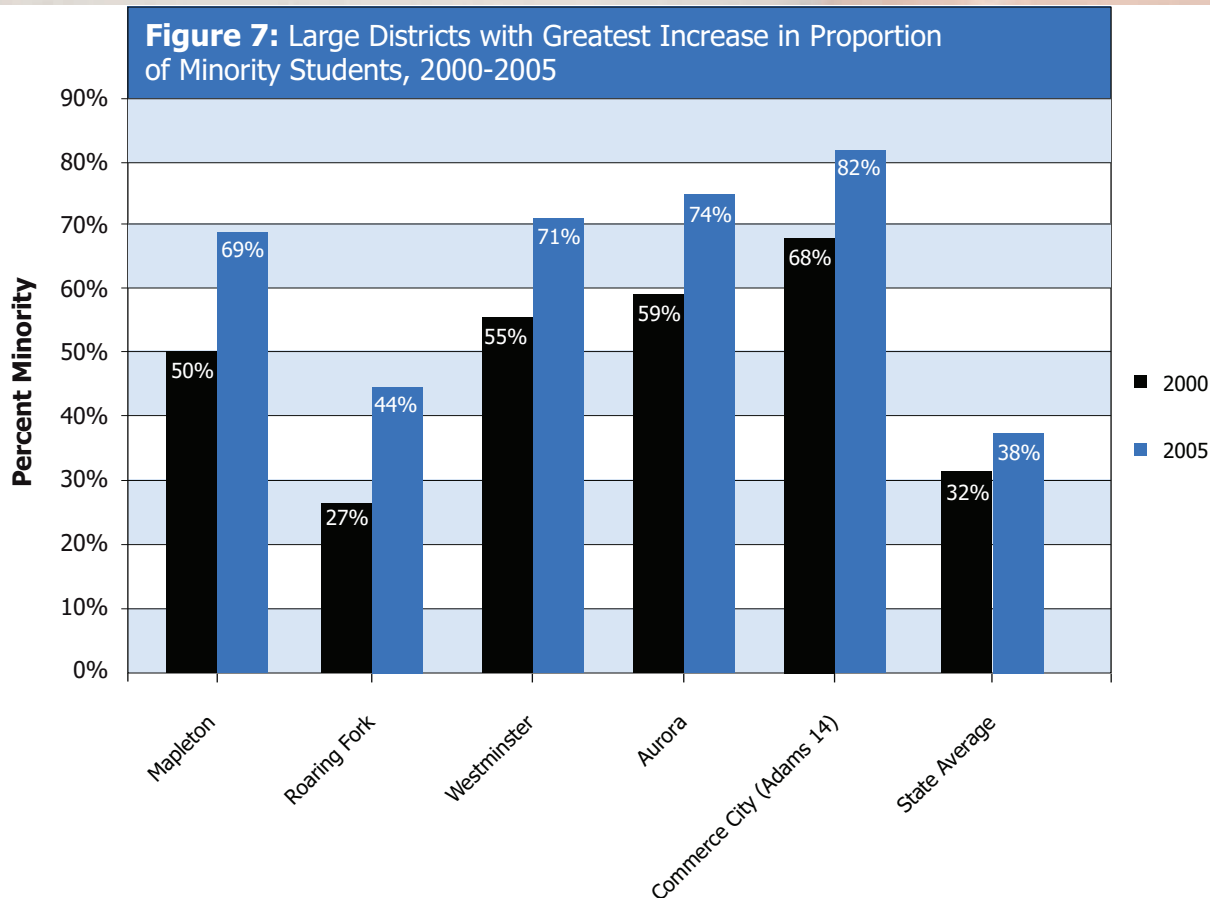
Figure 7 shows the large districts (those with over 200 teachers) with the largest changes in their proportion of minority (non-white) students. As with earlier analysis in this report, this focused on the largest districts (those with over 200 teachers) in order to capture significant changes. It should be noted that a significant majority (139) of Colorado districts do not fall into this large district category. Many of these smaller districts face additional challenges in recruiting and retaining teachers due to their rural nature.

These large districts increased between 14 and 19 percentage points in their proportion of minority students between 2000 and 2005. The largest change, 19 percentage points, occurred in the Mapleton school district. In other words, an average 20 student Mapleton class with 10 minority students in 2000 had 14 minority students in 2005.

Across the state the proportion of minority students increased by 6 percentage points from 32% to 38%. The average Colorado classroom with 20 students had about 6 minority students in 2000 and between 7 and 8 minority students in 2005. Latinos were the primary group that showed growth (5+ percentage points). The proportion of Asian and Native Americans remained under 1 percent of the total student population.

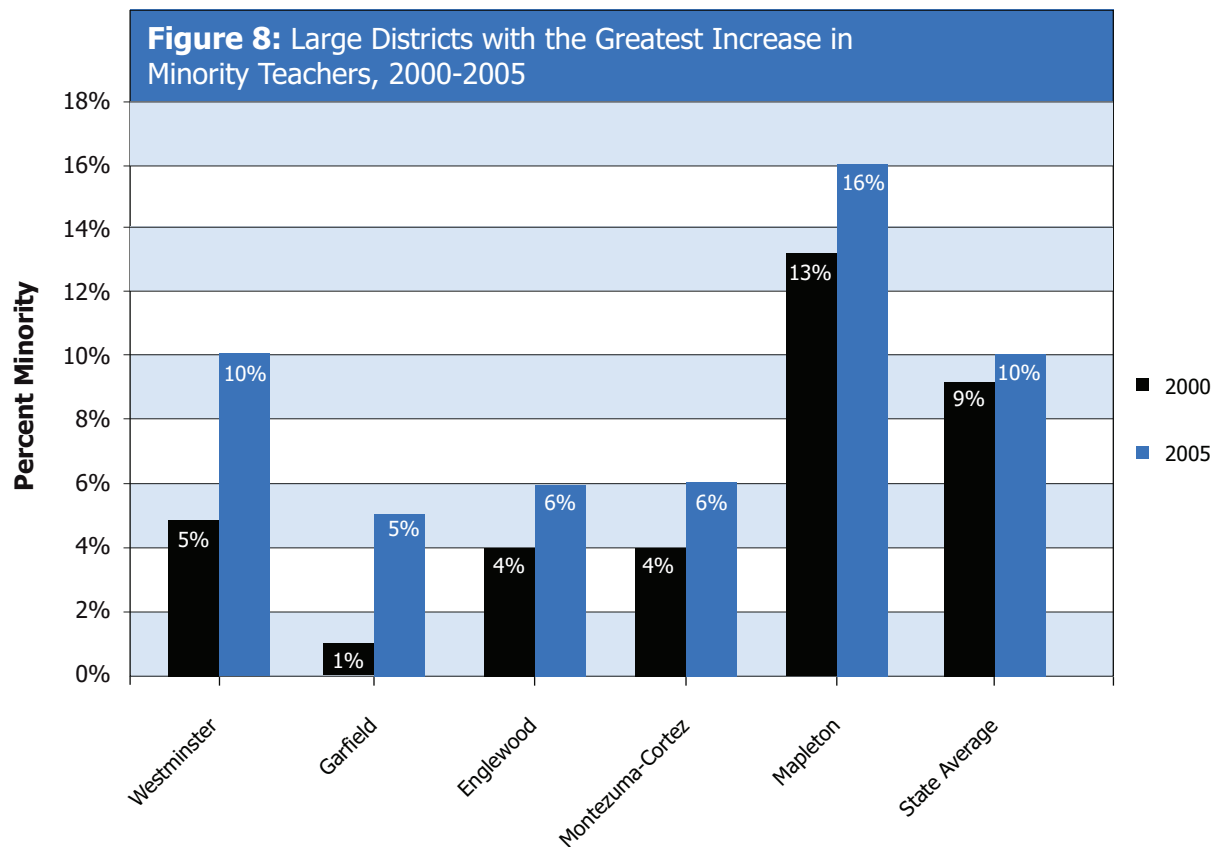
The number of children who are English language learners has increased greatly over the past five years from 86,129 in 2002 to 106,413 in 2007. For the average district of 4,000 this represents an increase of about 70 students. The large majority of these students are Spanish speakers; however the top five

languages spoken in Colorado schools include Vietnamese, Russian, Korean and Hmong (CDE Student Enrollment data, CDE English Language Acquisition Unit, 2007).



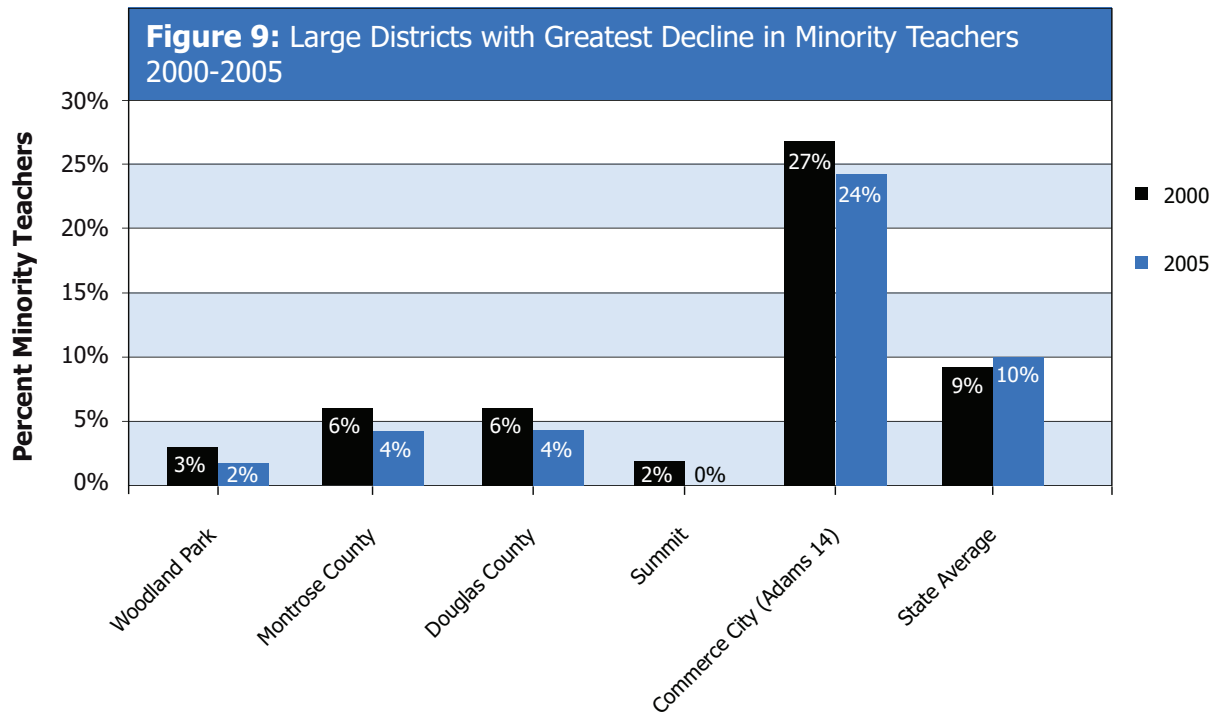
Source: CDE

The change in the proportion of minority teachers was much smaller than increases in the proportion of minority students. School districts had one percentage point more minority teachers in 2005 than in 2000. In a district of 200 teachers that translates to about 2 more minority teachers. Several of the districts with high growth in minority students also had high levels of growth in minority teachers. Figure 8 shows the five large (over 200 teachers) districts with the greatest increase in minority teachers. Several of the districts with large changes in minority students also had large changes in minority teachers. Mapleton had the largest increase in minority students and one of the largest increases in proportion of minority teachers in the state. Westminster also had large increases in both minority students and minority teachers.



At the same time, some districts lost minority teachers. Figure 9 shows the large districts with greatest decline in minority teachers. The districts with declining numbers of minority teachers include Commerce City (Adams 14) which had one of the largest increases in minority students.





However, while the proportion of minority enrollment and teachers went in the opposite direction in Commerce City (Adams 14) this does not reflect the overall pattern of minority teacher and student growth in Colorado. An average Colorado school with minority students in 2005 was more likely to have more minority teachers than in 2000 as indicated by the increase in the correlation between proportion of minority students and teachers shown in Table 7. However, as suggested by the earlier data, the difference between the proportion of minority students and teachers grew between 2000 and 2005 from 22 percentage points to 27 percentage points. Taken together, this suggests that although minority teachers are more likely to be found in schools with minority students in 2005 than in 2000, the growth in the proportion of minority students is outpacing the growth in minority teachers.

	2000	2005
Correlation of proportion of minority students and teachers school	.60	.62
Average difference in proportion of minority students and teachers	22 percentage points	27 percentage points

Source: CDE SAR, Enrollment and HR data

Taken together three key points emerge about the changes in minority enrollment and teachers:

- First, the proportion of minority teachers is growing, but much slower than the growth in the proportion of minority students.
- Second, the size of the enrollment change and change in the proportion of minority teachers varies greatly across districts.
- Third, in general, schools with minority students in 2005 were more likely to have minority teachers than in 2000.

Is the supply of teachers changing?

As discussed above, the growth in minority teachers is not keeping pace with the growth in minority students. Since about half of Colorado's new teachers are prepared in Colorado (Shining the Light, 2006), Colorado's teacher preparation system is a very important part of the response to a changing student population. There are two routes to teaching for those prepared in Colorado, preparation at institutions of higher education (IHE) and alternative programs run by districts in partnership with universities. Data on the race of teachers in alternative teacher preparation programs are not collected by the state; however that data are collected for IHE teacher preparation programs.

Table 8 shows that at least 13% of the 11,086 students enrolled in traditional teacher education programs were minorities in 2005 (Colorado Commission on Higher Education [CCHE], 2007). This includes both those pursuing initial licensure and those who have returned to higher education for additional study. In comparison, 17% of all students in Colorado four-year colleges and universities (not including community colleges) were minorities (Colorado Commission on Higher Education, n.d.). It may not be appropriate to compare the enrollment in teacher education programs since the data from CCHE includes both new and experienced teachers. Experienced teachers have incentives to return to higher education institutions to increase their salary. These returning teachers are more likely to be white, and thus may decrease the minority enrollment in teacher education programs when compared to the overall enrollment in higher education.

The proportion of minorities in teacher preparation is larger than the proportion of minority teachers (13% compared to 10%). However, it is not clear whether teacher preparation programs have the same proportion of minority students as the universities where they are situated because the data available do not allow a simple enrollment comparison.

Table 8: Teacher Education Enrollments for All Endorsements and Licensure Areas 2005-2006	
Race / Ethnicity	Percent of Total
American Indian or Alaskan Native	1%
Asian or Pacific Islander	2%
Black, non-Hispanic	3%
Hispanic	8%
White, non-Hispanic	79%
Unknown/Not Reported	8%
Total	101%*

* Total does not equal 100 due to rounding

Source: Colorado Department of Higher Education (CDHE) March 2007 Report

Another way to examine the issue of changes in minority teachers is by looking at new hires. Analysis of CDE Human Resources data shows the proportion of new teachers (i.e. no experience) who are minority teachers has increased from 9% in 2000 to 11% in 2005. And it appears the proportion of minority teachers prepared in Colorado remained steady at 56% across those years. In other words, districts appear to be improving in their ability to recruit minority teachers and data suggests that a little more than half of those minority teachers are prepared in Colorado (through both traditional and alternative programs).

Taken together it appears that increasing the number of minorities in teacher preparation is an important element in increasing the minority teacher workforce, as are efforts earlier in the pipeline that encourage minority high school students to consider teaching as a career.

Conclusions about Teacher Attrition and Diversity

The central issue for schools and districts for improving their students' learning is improving the quality of their teachers. This means districts must attract and retain the best teachers possible. In this section, the ability to retain teachers overall and minority teachers in specific was addressed. What is clear from the above data is that not all districts or schools face the same challenges or successes in attracting or retaining teachers.

Attrition

Since the challenges vary by district, the state's response to those challenges should also be different. Those districts and schools with the largest challenges should receive additional support, with a focus on low performing schools. Because of the correlation between attrition and low performing schools, it is clear some of this support should be in the form of mentoring and induction support for new teachers and in particular those in low performing schools in particular. Pay incentives, such as the market incentive in Denver's ProComp²⁴ plan also offer an innovative way to support teachers working in hard-to-staff schools.

However, there are also districts with higher than average attrition. The state can play a valuable role in supporting these districts. We recommend that a teacher retention task force be established at the Colorado Department of Education to examine and coordinate its role as a leader in addressing teacher recruitment and retention issues. The Colorado Department of Education should consider teacher retention a priority issue when determining formula and competitive grant criteria (e.g., NCLB Title IIA, special education State Improvement Grant) to focus on the schools and districts facing the greatest challenges in retaining quality teachers.

District policymakers should use attrition data to examine the teacher workforce to learn about current and potential future challenges. These challenges could include not only an aging workforce, but also a salary system that does not align with the district's goals or labor market.

If the overall district or schools within the district are experiencing high attrition rates, policymakers should:

- Examine its new teacher placements to ensure that new teachers are not being concentrated in low achieving schools,
- Examine the effectiveness of its new teacher mentoring and induction program,
- Work with teacher preparation institutions to ensure teachers are prepared to work with the increasingly wide range of students,
- Determine if additional induction and mentoring resources can be strengthened in high attrition schools.

²⁴www.denverprocomp.org

Diversity

The good news is the diversity of Colorado's teacher workforce is slowly growing. The challenge is that the diversity of the student body is growing faster. As with attrition, districts face different challenges in terms of attracting a diverse teacher workforce.

The key goal is increasing the number of minority teachers being prepared in both traditional and alternative programs. Here the state has two roles. First, our colleges and universities should be encouraged to produce as many minority teachers as is possible. To this end the state should work with districts and higher education institutions to increase the number of minorities going into teaching through a comprehensive and systematic recruitment strategy. This could include increased use of *Teacher Cadet*²⁵ type programs to recruit interested minority high school students, increased attention to recruitment on higher education campuses, and/or the creation of statewide recruitment/incentives to direct well-qualified adults (e.g. career changers) into traditional and alternative preparation programs.

Second, as with teacher attrition, the state should focus support toward those districts facing the largest growth in minority students. These districts should be given extra support in recruiting, mentoring, and retaining minority teachers.

In districts, policymakers and practitioners need to examine if they are being successful at recruiting (and retaining) minority teachers. If they are not being successful, a deeper examination is in order. Those districts with the largest challenges should work together to pool their efforts to better recruit and support minority teachers and partner with higher education institutions to prepare more minority teachers.



²⁵<http://www.coloradoteachercadet.com> Teacher Cadet is designed to attract talented young people who possess exemplary interpersonal, academic and leadership skills to consider teaching as a career. In Colorado there are trained Teacher Cadet sites in 35 schools within 21 school districts. In 2007-08, some 300 students are enrolled in the program. Teacher Cadet is an honors level high school course developed and licensed by the South Carolina Center for Educator Recruitment, Retention, and Advancement (CERRA).

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