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# Teacher Identifiers and Improving Education Practice:

## Experiences in Colorado and the Nation

July 2009

Edited by Emmy J. Glancy and Robert Reichardt from the Center for Education Policy Analysis (CEPA) School of Public Affairs, University of Colorado Denver
www.cepa.ucdenver.edu

This report was made in partnership with the Colorado Children's Campaign with support from the Bill and Melinda Gates Foundation.

# *Teacher Identifiers and Improving Education Practice: Experiences in Colorado and the Nation*

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# TABLE OF CONTENTS

# Introduction

On Friday, February 27, 2009 the Colorado Children's Campaign and the Center for Education Policy Analysis (CEPA) at the University of Colorado, cosponsored an informative, interactive symposium on using data linked to unique teacher identifiers (teacher ID data) for improving research, programs and policies that make a difference in teacher development and student achievement. The panelists represented a wide range of perspectives, from researchers to practitioners, focusing on Colorado and examples from across the country. This report is a compilation of the papers the expert panelists have written. This issue is especially relevant as the Colorado legislature considers creating an educator identifier pilot program. This information is also helpful as the state prepares applications for federal funding from the U.S. Department of Education or allocates existing federal formula funds that can be used to support the development and implementation of data systems that include teacher identifiers and use them to improve schools.

# Executive Summary

This series of five white papers explains how the teacher identifier is being used in Colorado districts and nationwide to improve teaching and learning, and provides advice to Colorado policymakers in creating a statewide teacher identifier. The first article by Robert Reichardt explains what the teacher identifier is and provides an overview on how the identifier is being used across several Colorado school districts. The purpose of the teacher identifier is to reliably bring together multiple streams of data, including student assessment data. The identifier needs to be consistent and unique, and provide the lowest possible risk of problems associated with identity theft. It is being used by district that have invested in the data infrastructure to inform educator reflection in the classroom, school and central office.

The second article by Jason Glass describes the history and uses of the teacher identifier in Eagle County Schools (ECS). The core reason for creating and using teacher identifiers in ECS was to improve student achievement through a more sophisticated use of assessment data. The process of creating unique teacher or student identifier numbers was not particularly complex or technical. The process of correctly aligning the teacher identifier number with the appropriate student identifier number is incredibly complex and technical. Further, the decision about what form of assessments and what kinds of analysis techniques are appropriate to determine teacher effectiveness is also very complex and technical. Despite the technical barriers, the teacher identifier provides district and school leadership with quantitative information to inform professional development decisions and personnel assignments within schools. Finally, the identifier helps ECS evaluate the effectiveness of a number of different instructional approaches being implemented across the district

In the third article, Elliott Asp describes Cherry Creek School District's (CCSD) use of a unique teacher identifier. CCSD created a teacher identifier to link student achievement data to specific teachers in 2002 as part of the process of developing a growth model. The growth model uses assessment data to describe student learning and targets for achievement. The teacher identifier is used to provide teachers and building administrators with information on student growth and targets for individuals and groups of students. The teacher identifier also enables teachers and building administrators to examine relative teacher effectiveness and set goals for improvement. The challenges to using this kind of data are both technical and cultural. In order for teachers to use this kind of information, they must have access to it and be trained to interpret it. Overcoming barriers to the use of the data requires training, sensitivity on the part of administrators, and most importantly, trust among teachers, and teachers and administrators. Without this cultural context, fear and resistance to change will derail efforts to create and use this very valuable data source.

The use of teacher identifiers in other states and in national research is the focus on Dan Goldhaber's writing in article four. When good information exists about the match of teachers and students, educators and policymakers can learn how equitably students are distributed across

teachers who hold different skills or qualifications and whether these credentials are related to student learning.

Perhaps more importantly, one can assess the relationship between teacher credentials and their effectiveness, as measured by their contribution toward student achievement growth. A striking finding from the relatively new studies of teacher effectiveness is that individual teachers can have profound impacts on student achievement. This body of work also shows that there are major differences between teachers in their effectiveness. Surprisingly, the differences in teacher effectiveness are only weakly related to most teacher credentials. Even where a credential matters in a statistical sense, as in the case of teacher experience or National Board Certification, there is a significant amount of overlap in effectiveness between teachers who appear to be alike in terms of their credentials. What this means, for instance, is that the average teacher with three years experience is more effective than the average first-year teacher, but there are many first-year teachers who are more effective than the average third-year teacher.

Dan Goldhaber's chapter goes on to make the case that having teacher identifiers that can be linked to students represents a tremendous opportunity to use the vast amounts of data that states already collects to learn a great deal about school policies and programs. This would in turn make K-12 schools more of a learning system. The up-front investments in data systems impose obvious short-run costs, but offer the longer-term opportunity to inform policy decisions leading to improved youth outcomes.

The final article contains the findings of Augenblick, Palaich, and Associates (APA) on costs and implementation issues associated with developing a teacher identifier system in Colorado. The timeframe for and cost of implementing a teacher identifier system are affected by two critical elements: the purpose of the teacher identifier system and the sophistication of the computing platform on which the system was to be built. APA recommends a four-step process over a three-year timeline for implementing a teacher identifier system in Colorado: design, develop, rollout, maintain. The projected cost to develop a teacher identifier system in Colorado ranges from about $686,000 to at least $2.7 million, depending on which components are included.

With the passage of HB-09-1065 Colorado is poised to implement a teacher identifier. Seven key insights and recommendations for Colorado policymakers emerge from these white papers:

1. Teacher identifiers are unique numbers that allow linking of teacher and student data.
2. Teacher identifiers are being used now by Colorado schools and districts to support improved instruction, staffing, program improvement.
3. Teacher identifiers are being used in other states and nationally to inform policymaking and practice.
4. Effective use of the identifier requires technical capacity, training, sensitivity, and trust.
5. Colorado should define a clear goal for the use of the teacher identifier.
6. Accuracy is central to the value of the data created using the teacher identifier; systems for verifying and validating the data must be part of a teacher identifier data system.
7. Implementation of the teacher identifier should be done in consultation with districts and be accompanied by modern database systems for all of the state's education data collection and management.

Teacher identifiers and related data systems have been identified as part of systematic efforts to improve education quality and results, and are central to the federal "Race to the Top" grant competition. The implementation of the teacher identifier will help Colorado in that competition and in its efforts to close the achievement gap; it will ensure that all students have quality teachers; and it will increase post-secondary access and success.

# Uses of Teacher Identifiers by Colorado Districts

*By Robert Reichardt, Ph.D., Center for Education Policy Analysis, School of Public Affairs, University of Colorado Denver*

Colorado is engaged in a debate over the creation of a teacher identifier. To support an informed debate, the Colorado Children's Campaign (CCC) and the Center for Education Policy Analysis (CEPA) at the School of Public Affairs, University of Colorado Denver sponsored a series of five papers on the uses of teacher identifiers. This paper provides an introduction to the teacher identifier and discusses how several innovative school districts in Colorado are currently using data linked to teachers (with a unique teacher identifier) to improve teaching and student achievement.

This paper reports the findings from interviews with eight district administrators from five Colorado school districts. Colorado-based policy analysts and professional developers identified these districts because of their innovative use of teacher data. The districts represented in these interviews are some of Colorado's largest districts (over 25,000 students) as well as several mid-sized districts (under 10,000 students). These districts are not believed to be typical Colorado districts and thus the uses reported here should not be considered typical, but instead these are districts at the leading edge of the use of teacher identifiers.

## What is the Teacher Identifier

All of us have an identifier; it is our name. However, in this context the purpose of the identifier is to reliably match data between various computer-based data sets. So, the identifier needs to be consistent and unique, and provide the lowest possible risk of problems associated with identity theft. That is, it must be consistently associated with a person over time and unique to that person. Identifiers like names or Social Security numbers create unacceptable identity theft risk. Names are also poor identifiers since names can change, and sometimes we share names with other people.

Teacher identifiers are some unique number or combination of numbers and letters. We are all familiar with this type of identifier, our Social Security numbers and our driver's license numbers are both unique identifiers. And Colorado has assigned unique identifiers to students for several years (sometimes called SASIDs or state assigned student identifiers).

The point of identifiers is to link data between different data sets. A teacher identifier links an individual's training, preparation, demographics, past experience, and other data about the teacher with their current assignment. Teacher identifiers can also connect data between teachers and their schools, such as their student demographics, size and location. Each of these types of connections is fairly common. The more innovative and important use of the teacher identifier is to connect teachers with the students they teach. Student data can include demographics, program participation (such as English language learners or special education through having an Individual Education Plan), grades, and student assessment scores.

In the districts interviewed, teachers are routinely assigned unique teacher identifiers, and often multiple teacher identifiers. The districts payroll systems assign and course management systems can each assign identifiers. It is reasonable to believe that most district data systems assign unique identifiers to teachers. In other words, teacher identifiers are a common part of most district operations. What is not common is using the identifiers to link data sets and inform practice. The districts interviewed for this study had taken the next step, using it to link teachers to their students, and to reflect on practice with the information created through this linkage.

There are two basic mechanisms for matching teachers and their students: using test forms to make the link or using a course data set. Test forms provide an easy, but not particularly data-rich, way to match teachers with their students. This is done by simply putting teacher and student identifiers on the assessment forms. Then when the assessments are scored, the teacher identifier is included in the assessment data-set. This method of linking students to teachers is often limited to only the data on the assessment form and only provides information about students who are assessed and the teachers who teach subjects that are assessed by the state or district.

A richer source of information is provided by linking students and teachers through a course-based data system. This data system contains information on the adults that teach courses and the students who take those courses. This provides more complete information on all teacher and student links, not just the links between teachers in courses with common assessments and students in those courses. However, it also requires a course data system and the technical capacity to use the course data to link teacher and student data.

Regardless of the system used to link students to teachers some sort of verification and correction process is important. Since the data created with the teacher identifier is only useful if it is accurate, it is imperative that teachers and principals can ensure the data reflect the reality in the classrooms.

## Limitations When Linking Teachers and Assessment Data

Teacher identifiers are a central component in data systems that bring together multiple streams of data, including student assessment data. District officials interviewed for this study stressed the importance of using multiple measures for evaluating the performance of any individual student, teacher, or principal. Teachers, school leaders and district leaders all have multiple sources of information they can use to contextualize and help interpret data that teacher identifiers can help provide. This contextual data includes everything from a teacher's knowledge about student learning styles or disruptions in student's home life that is not captured in a district data-set to a principal's knowledge of particularly challenging students or logistical challenges that are in any one classroom.

Equally important, many teachers work in subject areas that are not assessed with state or district assessments. For example, at most a third of teachers work in courses with regular state assessments (e.g. CSAPs). State or district assessments are important because they can allow comparisons of student learning within a classroom with students across a district or state. Often these tests have been professionally developed and have a higher degree of validity and

reliability than locally developed tests. While district assessments can add information about more teachers, it is important to recognize that most teachers will not work in classrooms that are regularly assessed in ways that can provide comparative data between classrooms across a district.

Finally, within many classrooms or subject areas, students are taught by multiple teachers. This is standard practice in secondary school and good educational practice in many elementary schools. An elementary classroom can have many teachers working with any one student. For example, a student may move among different classrooms to receive special services and work with different adults as the student moves between reading groups. This makes the task of assigning a student (and potentially his learning gains) to any one teacher challenging. (For more on this issue see the associated paper by Jason Glass in this set of papers.) However, as will be discussed below, there are many uses for these data that do not require precise assignment of student gain to any one teacher.

## How Are Teacher Identifiers Used in Districts

*"Our district wants teachers who are reflective. If they are afraid of data, they should not be part of our team." District Leader*

The leading-edge school districts that were part of this project are using teacher identifiers to improve teaching and learning. It is used to inform practitioners as they reflect on their practice at all levels of the system: classroom, team, school and district. Protocols or decision-making models are being developed for use with these data to support analysis and action. Finally, some districts use it as part of their teacher compensation systems. The next three sections discuss how data supported by teacher identifiers are used by teachers, principals and district leaders to assist in reflection and inform professional practice.

Districts must decide whether they want to create the technical capacity to use teacher identifiers to link students and teachers. This link is not the byproduct of ongoing district activities; districts must decide that the data provided by this link are worth the investment of district resources. The districts that decided to create this capacity did so to support continuous improvement and reflection on practice by teachers, principals and other school leaders, and by district leaders.

Finally, providing assessment data on a timely basis is very important. If data are not provided within a few weeks of an assessment, the usefulness of the data to teachers in terms of planning is greatly reduced. Why? Students have moved beyond what was assessed before the data can be useful for helping teachers plan instruction for those students. Thus, the optimum data system needs to be able to continuously update and manage new assessment data in order for it to be most valuable.

## Teachers and Teacher Identifier Data

Teacher identifiers are a central component of data systems that provide teachers with information on the students in their classrooms. The teacher identifier allows districts to link to teachers with a variety of student data including assessments, programmatic information (such as English Language Learner status) and demographics. This allows district data systems to provide

teachers with descriptive information on the classes they teach. The end result is the teacher identifiers allow districts to electronically provide teachers with data on their students.

Teachers use data from teacher identifiers in two ways: planning for the students they are serving and reflecting on practice. Some districts use teacher identifiers to provide teachers with information on their students prior to the beginning of the school year. So, before the teacher meets her students in the classroom for the first time, she can prepare her instruction, grouping and target where they start with their curricula. This gives teachers a head start as they prepare for their new class of students. The assessment data used for this initial class composition description are often state CSAP scores.

Teachers can reflect on past practices using student assessment data provided to them using teacher identifiers. These data systems provide a teacher with state or district assessment data from his students. A teacher can ask, "How well did I do with advanced kids and what should I do the same (and differently) with this year's instruction?" These data allow teachers to compare how his students are performing in his class compared to others in the school and districts.

District leaders expect teachers, working individually or in teams, to use these data to inform current instruction through reflection and inquiry. Reflection on data is often a team exercise among grade level teams or Professional Learning Communities within schools. The data helps teachers dig into questions such as:

- Who is behind in my class?
- Is the material paced correctly?
- Are there things I (or my colleagues) am doing in my classroom that are particularly effective?
- Are there other teachers in the school that may be able to help me/us improve my instruction?

The end result is that teacher identifiers can be a crucial tool for building teacher skills, knowledge, and teams.

## School Leadership and Teacher Identifiers

Just as with teachers, school leaders in some districts are being encouraged to use data provided through teacher identifiers to reflect on and inform their practice. These data can then be used to inform the most important staffing and curriculum questions facing principals:

- Are teachers assigned and teaching the subjects that highlight their strengths?
- Are the teachers working with students who are farthest behind, the ones who have the most success with these students?
- Is our curriculum aligned with the outcomes we want?
- Are all teachers using an aligned curriculum?
- Are there individual teachers who are having problems with particular parts of the curriculum?
- Should certain teachers be working together to improve their strengths and weaknesses?

- Is there confirmatory information from this assessment data that should inform the evaluation and retention of certain teachers?

As with teachers, these data inform reflection on these questions, but rarely provide clear answers to these questions. District administrators who participated in this study described the data as informing the reflection of leaders and not providing black and white answers. They also described a learning process where the strengths and challenges to using the data become apparent as people work with it. For example, slower gains by students within one classroom compared to similar classrooms in the same school can be the product of many different factors ranging from employment of a curriculum that is not aligned with the assessments, poor instruction, to simply teacher illness and associated teacher absences. The key use of the data is to uncover issues that require further investigation.

The data allows principals or school leadership teams to gather evidence around which areas are strengths for individual teachers. The data can highlight which teachers are particularly good at teaching a subject or a topic within a subject area. This information can then inform class assignments, ensuring our strongest writing teachers are teaching writing, or the weakest mathematics teachers focus on other subject areas. At the same time, schools can work to raise the achievement of the lowest performing students by using the data to make sure struggling students are assigned to the strongest teachers.

Finally, the data can be used for informing school leadership as they work to improve the professional skills of their staff. For example, school leaders in several districts work with teachers to set goals for student learning based on assessment data from each teacher's class. Principals and teachers sit down with the assessment data and discuss goals, grouping, instruction and curriculum. In several districts, school leaders use the data to identify teachers whose students are particularly successful in a given subject so they can be asked to share their methods with colleagues. Teachers whose students are not succeeding can suggest to a principal, team or Professional Learning Community the need to dig further and learn why the students are not succeeding. Supports for the students and their teachers can then be developed, such as help with teaching writing or comprehension. Other times the assessment results are part of a larger body of evidence from multiple sources that supports non-renewal of a given teacher.

## District Leadership and Teacher Identifiers

The use of data from teacher identifiers was less developed at the district level than at the school level, with the exception of the development of teacher compensation systems. Data about teacher programs can help district managers and leaders reflect on their practice and decisions. These programs include induction, professional development, or even simply preparation. However, districts reported that many of their data systems on teacher programs are incomplete or difficult to integrate with other data systems. District data has not historically been used to support evaluation, feedback and continuous improvement, and so little attention had been paid towards collecting and maintaining reliable and accurate data.

To some extent districts did report using teacher identifier data to examine programs operating inside their districts. However, most of those evaluation efforts were pushed by outside partners,

such as universities or teacher preparation programs. For example, a university-based National Science Foundation-funded teacher training program asked for data on teacher placement and retention, as well as student assessment test scores of participating teachers and a comparison group. Another example is an alternative teacher preparation program that asks districts to track teachers prepared in their program, their retention, and their relative roles in helping students learn. In both of these examples, the partner district interviewed in this study could not easily extract the data requested by these outside partners, and districts had to essentially use hand entry to respond to the requests for data.

Another example is a larger district working in partnership with university preparation programs to learn about the strengths and weaknesses of various sources of new teachers; e.g. what are the strengths and weaknesses of teachers prepared at University of Colorado Denver compared to those from University of Northern Colorado? However, a key challenge was poor information about where teachers within the district were prepared. In this instance, the university partners were asked to verify whom they prepared because of worries about the accuracy of district data.

Finally, as noted in the beginning of this section, payroll systems automatically assign teacher identifiers as part of the process of paying school district employees. The use of teacher identifiers expands as Colorado districts develop more complex alternative compensation systems. A teacher identifier is necessary for almost all facets of alternative compensation plans, not just performance pay. Alternative compensation programs in Colorado include components that require teacher identifiers to implement, including:

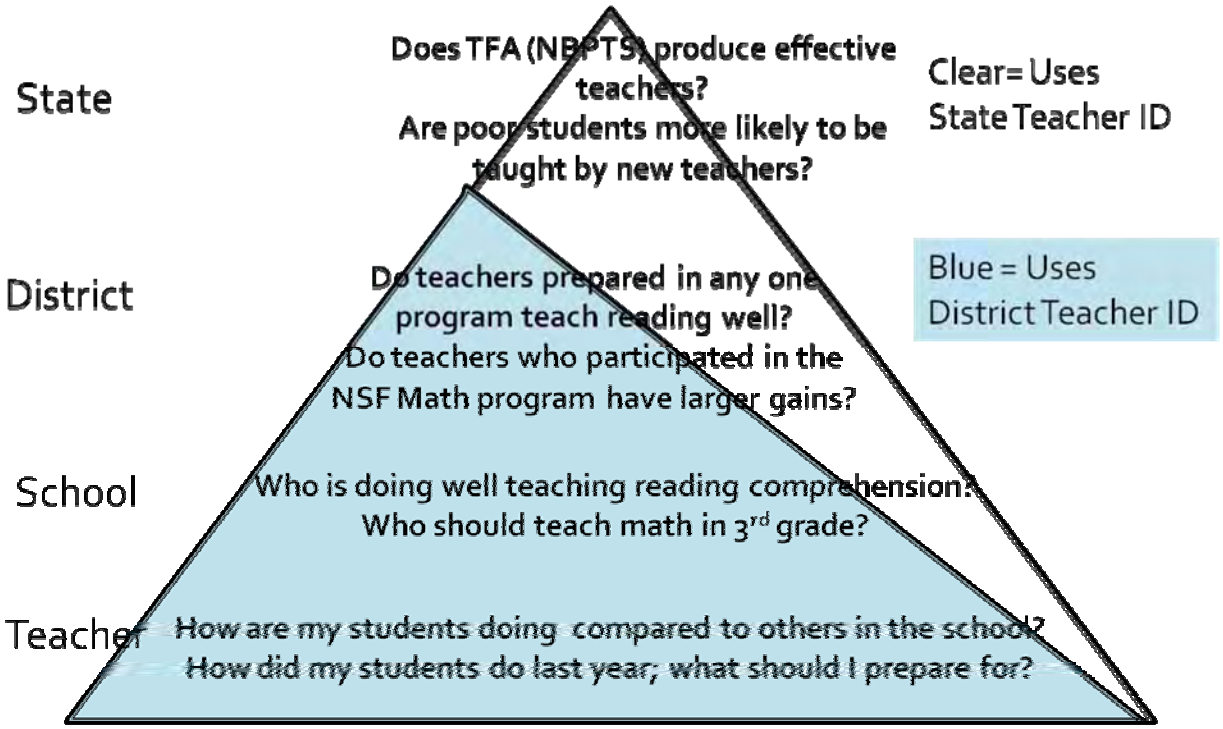
- extra pay for extra duties,
- market incentives based on working in subjects or locations facing shortages in supply,
- knowledge and skill based pay based on pay for participating in particular courses or other learning activities, as well as,
- pay for performance in terms of student gains on assessments or evaluations.

These complex alternative compensation plans require a data system that can identify where each teacher works, what she teaches, to whom, and also which professional development activities have been employed for each teacher, and professional evaluation results. As compensation systems increase in their complexity the importance of teacher identifiers increases.

## Teacher Identifiers and Improving Educational Practice

Teacher identifiers are a central component of data systems to support the continuous improvement of education practitioners at all levels: teacher, principal, district leader, and as discussed by other papers in this collection, by state leaders. Figure One illustrates the questions answered at all levels of the system with teacher identifiers.

**Figure 1: Teacher Identifier Use at Different Levels of the Education System**




Questions at the teacher, school and district level can all be answered using data systems that, in some instances illustrated in this paper, have been developed by Colorado school districts. Examples of these questions are in blue in Figure One. Some innovative Colorado school districts have invested in the data systems necessary to use data supported by teacher identifiers to reflect upon practice and support continuous improvement.

Development of a state teacher identifiers system has two advantages. First, it will help state practitioners answer the types of questions shown above for state policymakers. Second it can support the development of the data and analysis infrastructure in districts that have not yet created systems for using teacher identifiers. The result will be increased capacity throughout the education system for continuous improvement.

# Case Studies – Perspectives from the Field

# Eagle County Schools: The Use of Unique Teacher Identifier Numbers

*By Jason Glass, Director of Human Resources, Eagle County Schools*

## Introduction

Eagle County Schools (ECS) has been using unique teacher identifier numbers to link student performance to individual teachers for several years. The core reason for creating and using teacher identifiers for ECS is to ultimately improve student achievement through a better and more sophisticated use of assessment data. In the past, this linkage was used to determine individual teacher performance pay. The unique teacher identifier is currently used for teacher evaluation, human resource placement/allocation purposes and targeted professional development. This paper outlines the historical reasons ECS began using a unique teacher identifier, the technical issues it has encountered in this use, and how ECS currently uses unique teacher identifier numbers.

## Background

ECS serves about 6,000 students living in the central mountains of Colorado. The student population is diverse: 50% Hispanic and 37% English language learners. The district is geographically large, 1700 square miles, serving a wide variety of communities from ranching to resort towns. Students within district have multiple schooling options including private and charter schools and district leaders feel the need to be innovative to meet the expectations of families within ECS.

In 2001, ECS embarked on a monumental education reform program aimed at improving student performance, enhancing professional development for educators and increasing accountability and rewards for teachers through performance pay. While much of the reform model was drawn from the Milken Family Foundation's "Teacher Advancement Program" (TAP), the performance pay method was nearly completely locally developed and was without equal in its scope.

The performance pay system that existed in ECS from 2001 through 2007 consisted of an end-of-year bonus and salary increase. One determinant in this bonus and salary increase was based on a link between individual student assessment results and the teachers that taught them using the William Sander's "Value-Added" method. While risking oversimplifying the very complicated previous performance pay system, when student Value-Added results were statistically significantly positive, the teachers of those students got larger bonuses and larger raises.

The desire to link student results to individual teachers required the development of unique teacher identifier numbers that could be matched with unique student identifier numbers. The unique teacher and student identifier numbers were created using the district's student information system, *PowerSchool*. The state created student identifier was not used in this process.

The performance pay system was significantly overhauled in 2007-2008. At least part of the impetus for reforming the previous performance pay system stemmed from a number of issues relating to the use of the teacher identifier and, more specifically, the link of it to student results. While ECS still uses unique teacher and student identifier numbers to create a link between the two for Value-Added assessment calculations, these results are no longer used to pay teachers.

The process of creating unique teacher or student identifier numbers is not particularly complex or technical. The process of correctly aligning the teacher identifier number with the appropriate student identifier number is incredibly complex and technical. Further, the decision about what form of assessments and what kinds of analysis techniques are appropriate to determine teacher effectiveness are also very complex and technical.

The next sections will review some of these technical barriers to using the teacher identifier number as a tool in evaluating teacher effectiveness. It will also report on some promising uses of the teacher identifier currently being used by ECS.

## Technical Barriers

Intuitively, it seems simple to use identifier numbers to track teacher effectiveness. Let's say a particular teacher (we'll call her Mrs. Jones) has 25 students. We know who Mrs. Jones' students are and we know their test results. All we need to do is evaluate the results of those assessments and from that we can make an inference about Mrs. Jones' effectiveness as an instructor. The unique teacher identifier number and student identifier numbers allow us to link the two in a database and conduct any number of number-crunching exercises on the information. In reality, however, a number of complications arise.

In today's schools, the situation where one teacher provides all the academic instruction to one group of students is rare and is becoming more and more uncommon. Schools in the 21st century use "push in" and "pull out" models to provide specialized academic support and intensive instruction for students. ECS has co-teaching, Title 1 supports, content specialists supports, ESL supports and Special Education supports just to name a few. While in the past it may have been a fair assumption that Mrs. Jones was teaching her students reading, in today's configurations it is possible that several people are actually providing instruction in reading and in fact Mrs. Jones may not be teaching her class reading at all.

A number of critical questions arise: Who owns the kids' scores? What is the appropriate method of attaching students to teachers? How much instructional time must occur before the link between teachers and students is valid? What analysis method (achievement-based, longitudinal or growth-based, a combination, etc.) is appropriate? The lack of definitive answers to these questions confounds the ability to validly infer teacher effectiveness using a teacher identifier to student identifier link.

These problems are highlighted even more so at the secondary level. If Mrs. Jones were a high school math teacher, she may only have a particular student 1/3 of the year in the case of trimester schools (as ECS has). Someone else (say Mrs. Smith) may very well be teaching different math courses in the other trimesters and there may very well be other courses that integrate with mathematics (Mrs. Frank in science for example) that may impact student math scores. In this case, if a student had all three teachers (Jones, Smith, and Frank), who is that student's math teacher? And how long is does a student need to take a class from a teacher to reasonably tie the student's score back to the teacher? Again, the lack of definitive answers to these questions is a confounding factor.

A further complication is in the prevalence of valid assessments. What happens if Mrs. Jones is an industrial arts teacher or a music teacher, or if Mrs. Jones teaches preschool cognitive needs special education students? The existence of valid assessments in many specialty content areas and for several important subgroups is suspect at best. At ECS, we estimate that approximately 69% of our teachers could not be validly tied to student results because of scheduling or lack of valid assessment issues.

In addition to the teacher linkage issues and the valid assessment issues, another important question is: What kind of assessment analysis method is the most appropriate for inferring teacher quality? Pure attainment methods ignore important individual student characteristics that do have an important influence on student achievement and also ignore the important concept of student academic growth. However, using growth models is also problematic. Questions like "How much growth is enough?" or "Is there a standard of growth for all students?" and "Are the assessments appropriately vertically scaled to account for growth?" all must be considered in choosing a growth analysis method. Great strides have been made in the creation of combination models that look at achievement and growth. However, these carry with them some of the same problems the attainment and growth models do individually. In sum, it is not clear what assessment analysis method is appropriate for determining which teachers are most effective and it becomes more of a value question for the organization to determine what it wants to measure and reward.

## Solutions

To address part of the teacher-to-student alignment issue, ECS developed a web-based "Teacher of Record" system, which allows each building principal to assign up to three teachers to each student in the core content areas of reading, writing, and math. The system also features a reporting function that allows principals to print and send out alignment configurations to teachers for verification and correction. So, it is a collaborative process between the principals and teachers to align each teacher with the students they teach in reading, writing, and math. For core content teachers, this system allows us to keep track of which teachers own which student scores. By aligning teacher ID numbers to student ID numbers, we are able to make what we believe are valid associations for some of our teachers.

ECS uses the William Sanders "Value-Added" model as an assessment analysis method. While this method has its detractors and flaws in its complexity and somewhat "black box" methodology, we believe it is the most robust and accurate measure of teacher effectiveness

currently available. The "Value-Added" method takes into account a number of teacher and student variables and estimates the "value" a teacher added to the student achievement through instruction. Using unique teacher and student identifier numbers is fundamental and essential to this analysis method.

## Uses

As previously mentioned, ECS uses a unique teacher identifier to link teachers to students and from this is able to arrive at "Value-Added" calculations for some teachers. While I have illustrated several limitations to the utility of this method for inferring teacher quality, there are some very important end uses, which is why ECS continues with this approach.

Despite the technical barriers presented earlier, the teacher identifier can be used to evaluate teacher effectiveness in many cases. By determining the "Value-Added" measure for core content teachers who have significant instructional time with students and providing this to principals annually, we provide our school leaders with an important quantitative staff evaluation tool. This information can be used in deciding on promotions to teacher leader roles, as a component in deciding on non-renewal or dismissal, and is used as a piece of evidence in creating an improvement or remediation plan for a poor performing teacher.

The teacher identifier and the subsequent evaluative information that comes from its existence is used by district and school leadership to help make professional development decisions and personnel assignments within schools and within the district based on quantitative information. For example, we may learn through the "Value-Added" method that we have a teacher who is exceptional at math, but struggles with language arts. With this information, we can target intentional professional development for this teacher, or we can reassign him in a manner that best uses his strengths to improve student learning.

Finally, because the teacher identifier allows us to track effectiveness in different buildings and across different programmatic approaches, we are able to evaluate the effectiveness of a number of different instructional approaches being implemented in our schools. We have Expeditionary Learning schools, International Baccalaureate schools, Dual Language schools, 21st century technology schools and traditional neighborhood schools, just to name a few approaches in use at ECS. Assessment results that look at which teachers are using which programs in which schools help us decide which programs to support and attempt to replicate at other sites.

## Conclusion

In sum, using unique teacher identifier numbers for the purpose of determining teacher quality brings up a number of endemic complicating issues. Ignoring these issues moves us no closer to being able to accurately identify and reward our best teachers. However, in spite of these complicating factors, there are also several extremely valuable and important uses for a teacher identifier that Eagle County Schools has already adopted.

Taking this system statewide would probably require some kind of central processing point and standardization procedures to make the system and the data it yields comparable from one district or one teacher to the next. While this would probably be a necessity, it does create the possibility of reducing efficiency and increasing burdens at the local level and may require

additional local human resources and expertise, especially in smaller districts. To be successful, it would require additional skilled and effective human and technical resources at the state level. For ECS, a district that already has a process for establishing an identifier in place, it would make little difference if it was state mandated. However, it would create an impediment if the state process of creating and assigning the identifier carried with it a complex set of rules and bureaucratic hurdles districts would need to navigate.

Legislators should carefully consider the reasons for and implications of creating such a system. Given that human and financial resources are finite, we must consider if the results and inferences we might gain from such a system would be worth the costs, time and efforts. We should also fully understand both the promise and problems associated with the creation and implementation of a statewide teacher identifier system and consider these as the decision is made.

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# Case Studies – Perspectives from the Field

# Cherry Creek Schools – Linking Student Achievement Data to Teachers – Uses and Issues

*By Elliott Asp, Ph.D., Assistant Superintendent for Performance Improvement, Cherry Creek Schools*

## Introduction

Cherry Creek School District has used a unique teacher identifier to associate student academic performance with specific teachers for a number of years. This kind of data has been used for a variety of purposes including:

- Informing instruction and improving overall practice
- Examining teacher performance
- Exploring school effectiveness
- Setting goals for improvement

This paper will describe those efforts and also examine the challenges in using a unique teacher identifier that links student outcomes to specific teachers. CSAP results will be used as an example, although data from other assessments is also routinely linked to teachers as well (e.g., MAP, EXPLORE, PLAN, ACT).

Before discussing the use of a "teacher identifier," it would be helpful to review the district's goals and demographics in order to provide a context for the reader. The Cherry Creek School District is a large suburban school district (50,000 students, 60 sites) in the southeast region of the Denver Metro Area. Over the past ten years, the district has experienced a dramatic shift in the composition of its student population. Cherry Creek has the same number of white students that it had in 1998, but the overall population increased by 20,000 students between 1998 and 2009. Currently students of color make up about 38% of the student population and by 2012 that figure will rise to almost 50%. The percentage of students living in poverty (eligible for free/reduced lunch) is 22% and is expected to rise to 33% by 2012.

Cherry Creek is a high performing district with CSAP and CACT scores well above state averages and two-thirds of its schools are rated excellent or high under the state rating system (no schools have ever been rated low or unsatisfactory). However, there are significant and pervasive achievement gaps across racial and income lines. For example, the percentage of African-American and Hispanic students who score at the proficient or advanced level on CSAP is 30 to 35 percentage points lower (depending on the subject area) than whites and Asians. This gap is present in all high school feeder areas in the district.

Cherry Creek, as a system, is dedicated to closing those gaps and that commitment is reflected in its goals of college preparedness for all and excellence and equity. College preparedness is the aim of having all students ready to access and succeed in some form of postsecondary training (college, vocational training, or training upon entering the workforce). Excellence refers to improving the performance of all students (in our case to the level of college readiness) and at the same time decreasing the discrepancy between the highest and lowest performers. Achieving equity means eliminating the gap in performance across student demographic characteristics that should have no impact on achievement (i.e., race). These goals are aligned from the district, to the school, to the classroom. Every school must have an excellence and an equity goal as part of their school improvement plan and every teacher has a corresponding set of goals for her students. These goals form the context for all data analysis activities in the district and will be the focus of the examples in this paper.

## Overview of the Use of a Unique Teacher Identifier in Cherry Creek

Cherry Creek has been using a teacher identifier to link student achievement data to specific teachers since 2002. This was initiated in conjunction with the development of a district growth model. The Cherry Creek Model divides each of the CSAP performance level bands into 3 parts (e.g., proficient-low, proficient, proficient-high, see Figure 1).

### Figure 1: CSAP Performance Sub-Groups

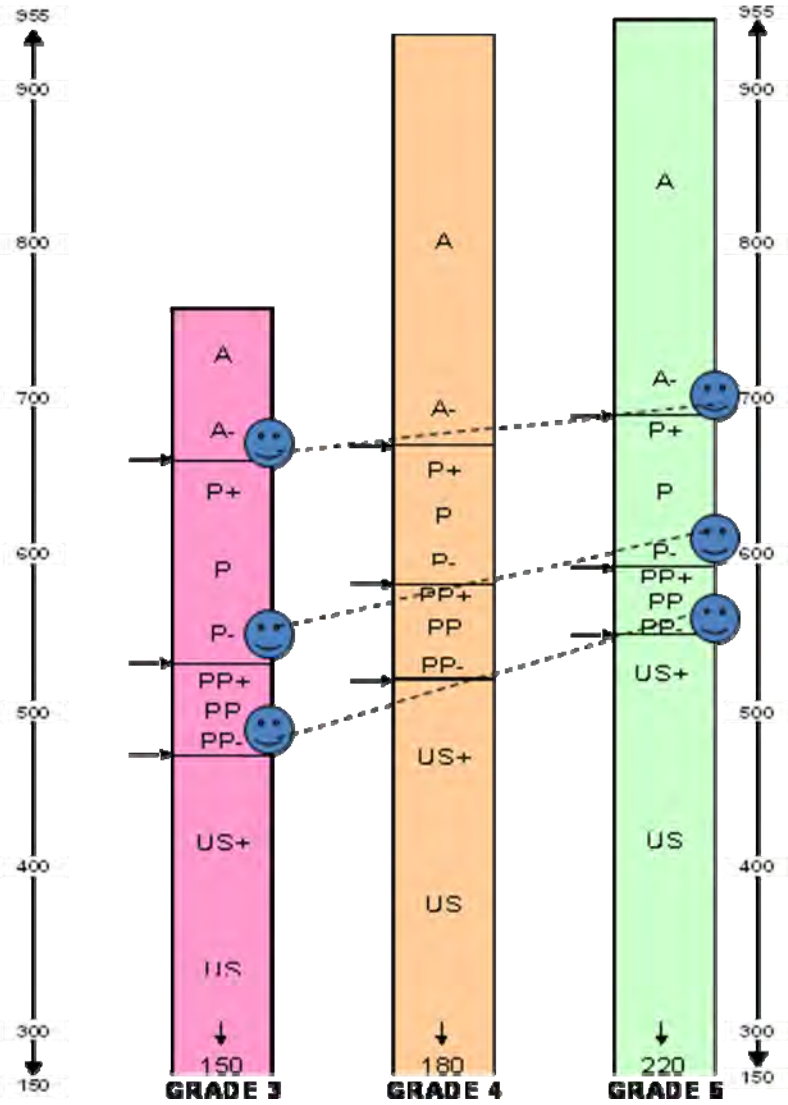
**CSAP Reading Grade 4 Spring (Students currently in Grade 5)**

*Chart Overall Test Scale Score____ OR Scale Score for Standard/Subcontent Area____ Indicate Standard/Subcontent Area_____*

| Unsatisfactory | | | | Partially Proficient<br>Cutpoint = 517 / S.E.M. = 15 | | | | Proficient<br>Cutpoint = 572 / S.E.M. = 13 | | | | Advanced<br>Cutpoint = 671 / S.E.M. = 20 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | "bubble" | | | | "bubble" | | | | "bubble" | | | | | | | |
| US- | | US | | US+ | | PP- | | PP | | PP+ | | P- | | P | | P+ | | A- | | A | | A+ | |
| 180 | 292 | 293 | 404 | 405 | 516 | 517 | 535 | 536 | 553 | 554 | 571 | 572 | 605 | 606 | 637 | 638 | 670 | 671 | 761 | 762 | 850 | 851 | 940 |

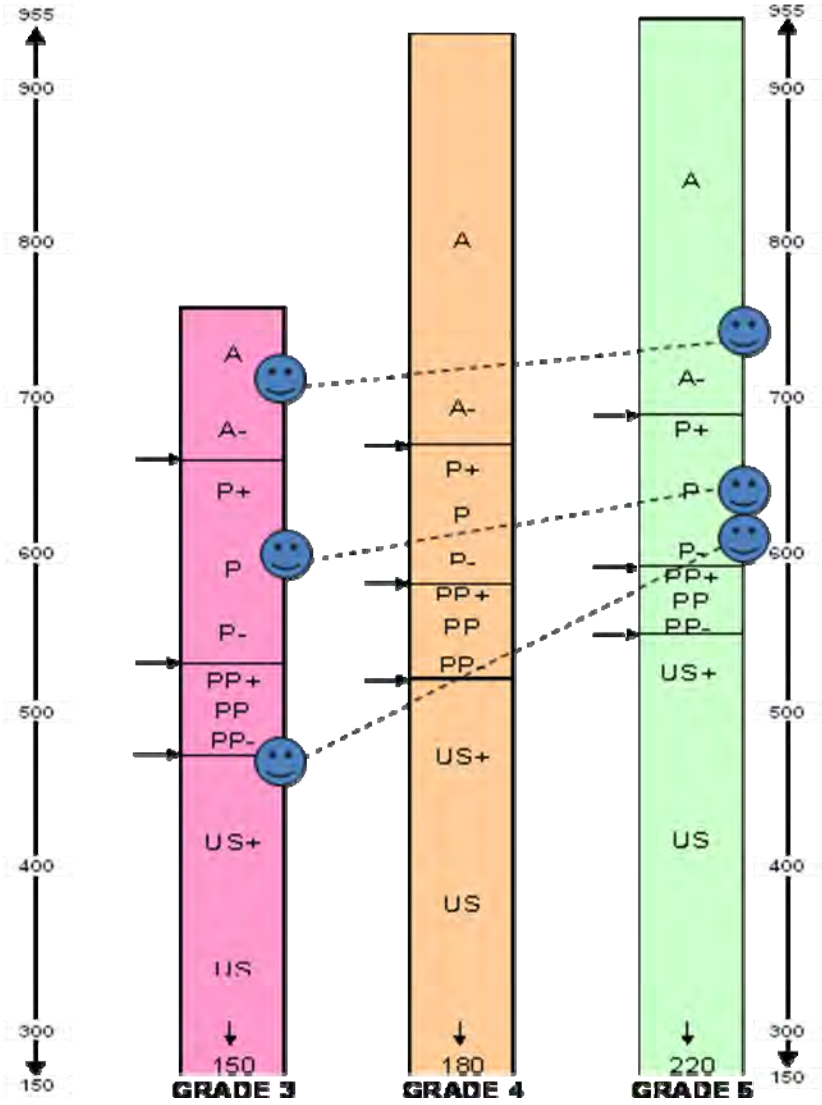
Each student's position in a performance level is identified (based on his scale score) and a year's growth is defined as maintaining the same position in the performance level from one year to the next. This requires a higher scale score even though the student did not move upward in the performance level (Figure 2).

**Figure 2: One Year of Student Growth**



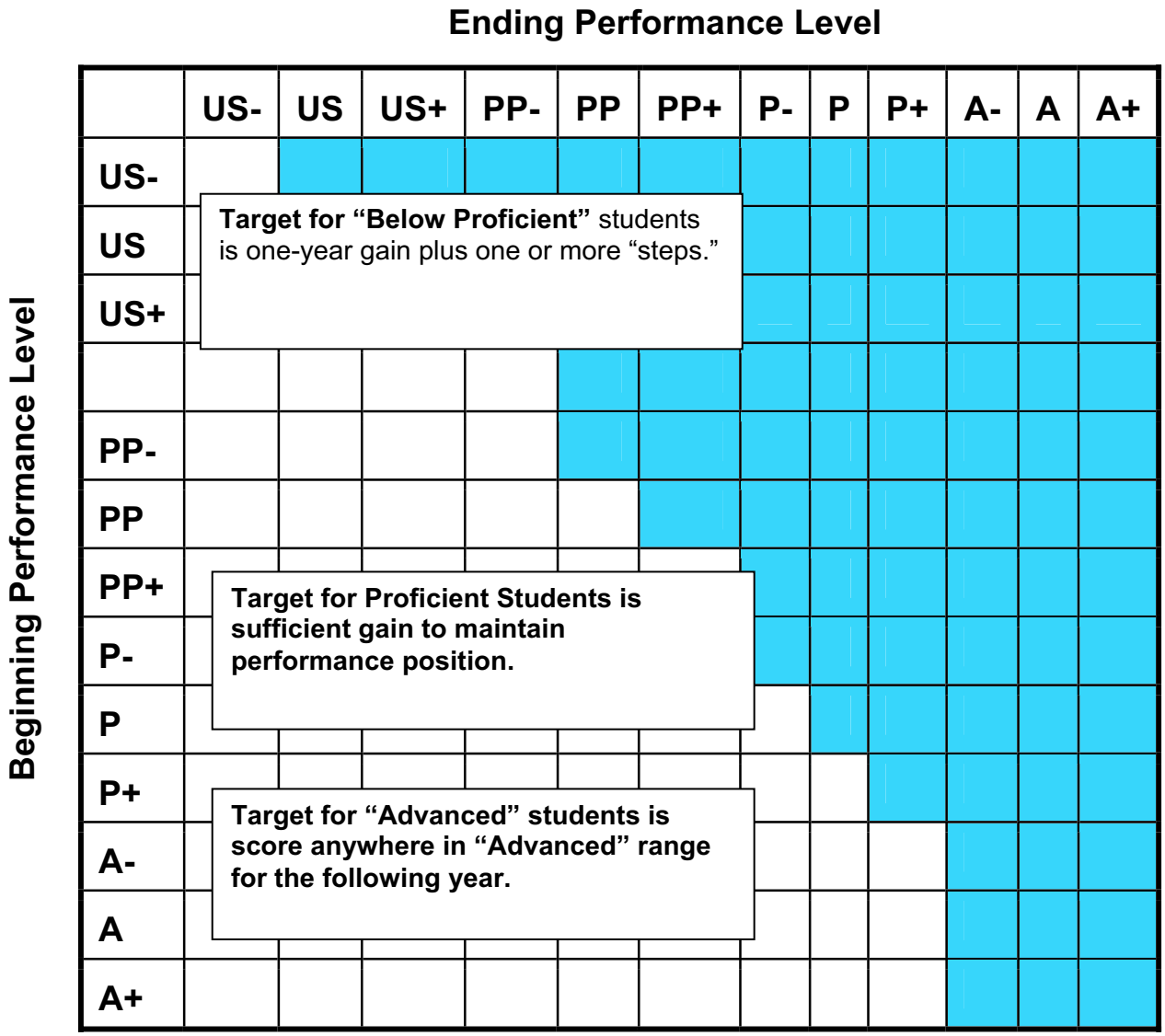

As can be seen in Figure 2, a year's growth for proficient and advanced students is, by definition, sufficient for them to continue to score at those levels or "keep up" (in fact, they can "lose ground" to some degree and still maintain their respective performance levels). However, for below-proficient students, a year's growth is not enough to move them to proficiency. Therefore, the district established differentiated growth targets for students based on their beginning CSAP performance level (using the 3-part performance level names, see Figure 3).

**Figure 3: CSAP Target Growth**



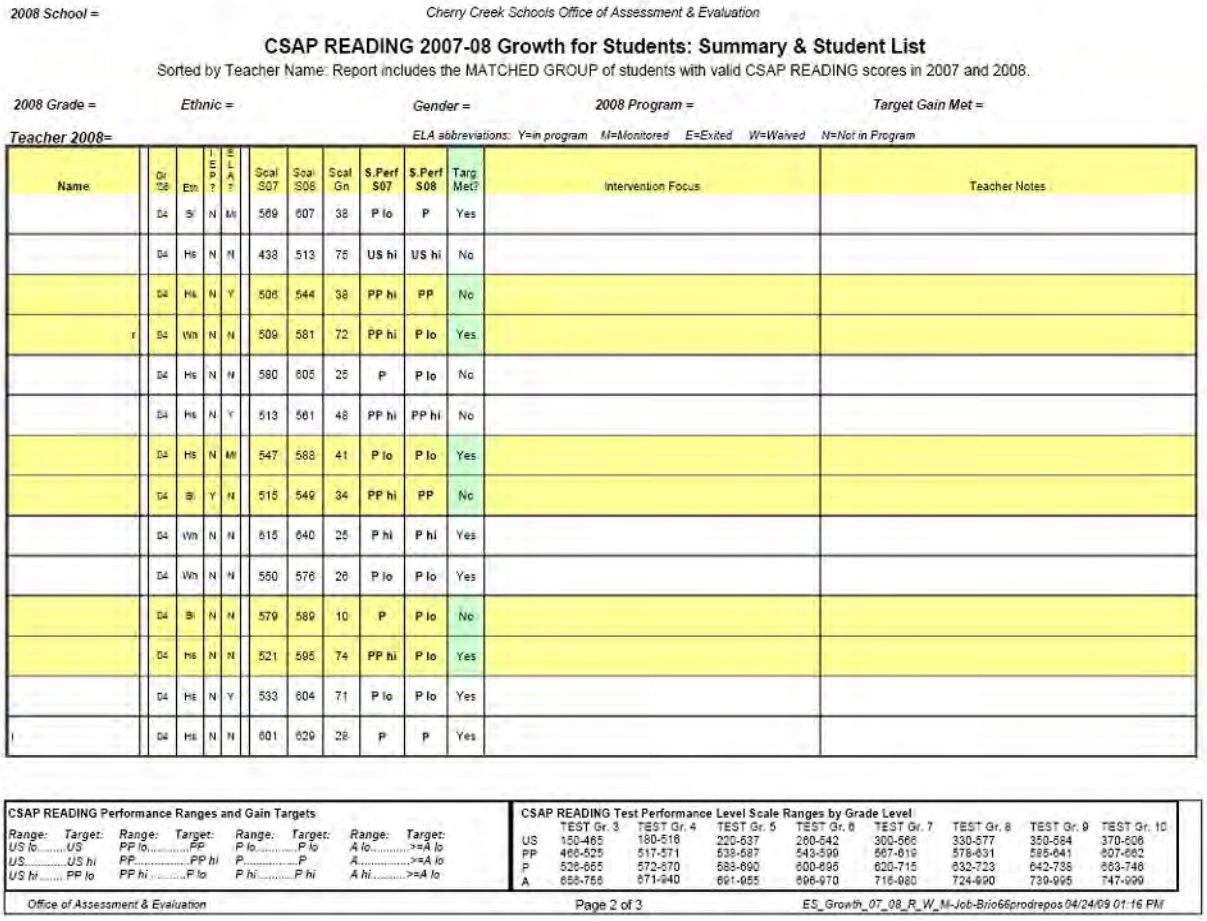

Advanced and proficient students are expected to maintain their performance levels (e.g., proficient high or advanced low). The goal for students scoring below proficient is a year's growth plus one performance band level. While we hope that below-proficient students would show even more than target growth over a year, our data confirm that the "one year – plus" target is a challenging goal for these students and their teachers and is not easily attainable on a system-wide basis. The growth targets for all performance level bands are displayed in Figure 4.

**Figure 4: CSAP Growth Targets**




The information generated from this model is given to all teachers who teach grades and subjects with CSAP testing. Teachers receive a report for all students in their current classes that displays scale score increases and progress towards growth targets for the past year. (Figure 5).

## Figure 5: Teacher Tools for Observing and Exploring Student Results



2008 School =

Cherry Creek Schools Office of Assessment & Evaluation

**CSAP READING 2007-08 Growth for Students: Summary & Student List**

Sorted by Teacher Name: Report includes the MATCHED GROUP of students with valid CSAP READING scores in 2007 and 2008.

2008 Grade = Ethnic = Gender = 2008 Program = Target Gain Met =

Teacher 2008=

ELA abbreviations: Y=in program M=Monitored E=Exited W=Waived N=Not in Program

| Name | Gr '08 | Eth | IEP? | ELA? | Scal S07 | Scal S08 | Scal Gn | S.Perf S07 | S.Perf S08 | Targ Met? | Intervention Focus | Teacher Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 04 | Bl | N | M | 569 | 607 | 38 | P lo | P | Yes | | |
| | 04 | Hs | N | N | 438 | 513 | 75 | US hi | US hi | No | | |
| | 04 | Hs | N | Y | 506 | 544 | 38 | PP hi | PP | No | | |
| r | 04 | Wh | N | N | 509 | 581 | 72 | PP hi | P lo | Yes | | |
| | 04 | Hs | N | N | 580 | 605 | 25 | P | P lo | No | | |
| | 04 | Hs | N | Y | 513 | 561 | 48 | PP hi | PP hi | No | | |
| | 04 | Hs | N | M | 547 | 588 | 41 | P lo | P lo | Yes | | |
| | 04 | Bl | Y | N | 515 | 549 | 34 | PP hi | PP | No | | |
| | 04 | Wh | N | N | 615 | 640 | 25 | P hi | P hi | Yes | | |
| | 04 | Wh | N | N | 550 | 576 | 26 | P lo | P lo | Yes | | |
| | 04 | Bl | N | N | 579 | 589 | 10 | P | P lo | No | | |
| | 04 | Hs | N | N | 521 | 595 | 74 | PP hi | P lo | Yes | | |
| | 04 | Hs | N | Y | 533 | 604 | 71 | P lo | P lo | Yes | | |
| I | 04 | Hs | N | N | 601 | 629 | 28 | P | P | Yes | | |

**CSAP READING Performance Ranges and Gain Targets**

| Range: | Target: | Range: | Target: | Range: | Target: | Range: | Target: |
|---|---|---|---|---|---|---|---|
| US lo | US | PP lo | PP | P lo | P lo | A lo | >=A lo |
| US | US hi | PP | PP hi | P | P | A | >=A lo |
| US hi | PP lo | PP hi | P lo | P hi | P hi | A hi | >=A lo |

**CSAP READING Test Performance Level Scale Ranges by Grade Level**

| | TEST Gr. 3 | TEST Gr. 4 | TEST Gr. 5 | TEST Gr. 6 | TEST Gr. 7 | TEST Gr. 8 | TEST Gr. 9 | TEST Gr. 10 |
|---|---|---|---|---|---|---|---|---|
| US | 150-465 | 180-516 | 220-537 | 260-542 | 300-566 | 330-577 | 350-584 | 370-606 |
| PP | 466-525 | 517-571 | 538-587 | 543-599 | 567-619 | 578-631 | 585-641 | 607-662 |
| P | 526-665 | 572-670 | 588-690 | 600-695 | 620-715 | 632-723 | 642-738 | 663-748 |
| A | 666-756 | 671-940 | 691-955 | 696-970 | 716-980 | 724-990 | 739-995 | 747-999 |

Office of Assessment & Evaluation Page 2 of 3 E5_Growth_07_08_R_W_M-Job-Brio66prodrepos 04/24/09 01:16 PM

Teachers also receive summaries indicating the number and percentage of students who made a year's growth and met their growth targets by performance level for each subject area (Figure 6). This information is also disaggregated by race (Figure 6).

## Figure 6: Teacher Growth Summaries

*2008 School = HLN* — *Cherry Creek Schools Office of Assessment & Evaluation*

**CSAP READING 2007-08 Growth for Students: Summary & Student List**

Sorted by Teacher Name: Report includes the MATCHED GROUP of students with valid CSAP READING scores in 2007 and 2008.

*2008 Grade =* *Ethnic =* *Gender =* *2008 Program =* *Target Gain Met =*

*Teacher 2008= Castleberry, Katheryn*

*Where did students in each 2007 performance level score in 2008?* | *How many students demonstrated decline, "1 Year" growth, or "Target" growth?*

| Prf S07 | Tested both years | # A | % A S08 | # P | % P S08 | # PP | % PP S08 | # US | % US S08 | # Decline | % Decline | # 1 Yr Gn | % 1 Yr Gn | # >1 Yr Gn | % >1 Yr Gn | # >= Target Gn | % >= Target Gn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 11 | 1 | 9% | 10 | 91% | 0 | 0% | 0 | 0% | 3 | 27% | 6 | 55% | 2 | 18% | 8 | 73% |
| PP | 7 | 0 | 0% | 2 | 29% | 5 | 71% | 0 | 0% | 2 | 29% | 3 | 43% | 2 | 29% | 2 | 29% |
| US | 3 | 0 | 0% | 0 | 0% | 1 | 33% | 2 | 67% | 0 | 0% | 2 | 67% | 1 | 33% | 1 | 33% |
| | 21 | 1 | 5% | 12 | 57% | 6 | 29% | 2 | 10% | 5 | 24% | 11 | 52% | 5 | 24% | 11 | 52% |

*Are there substantial ethnic or gender differences in target gains met (>=20-25 percentage points)?*

| Targ Gn Met? | Tested both years | # Asian, White tested both years | % Asian, White meeting target | # Black, Hisp, Am.Ind tested both years | % Black, Hisp, Am.Ind meeting target | # Female tested both years | % Female meeting target | # Male tested both years | % Male meeting target |
|---|---|---|---|---|---|---|---|---|---|
| Yes | 11 | 4 | 100% | 7 | 41% | 3 | 27% | 8 | 80% |
| No | 10 | 0 | 0% | 10 | 59% | 8 | 73% | 2 | 20% |
| | 21 | 4 | | 17 | | 11 | | 10 | |

***UNDERSTAND THE "BIG PICTURE."***
***Observe and reflect on my summary data shown above. Note important points and patterns that "pop out." Identify surprising or unexpected results. Note where more detailed student information is needed.***

***1. Highlight or otherwise note how many declined and improved in each performance level.***

***2. What do I notice about growth for students in each performance level (A, P, PP, US) last year?***

***3. Which groups of students pose additional questions?***

***4. Do I have any thoughts about how summary results for my class compare with those for this grade level at my school/in the district?***

**CSAP READING Performance Ranges and Gain Targets**

| Range: | Target: | Range: | Target: | Range: | Target: | Range: | Target: |
|---|---|---|---|---|---|---|---|
| US lo | US | PP lo | PP | P lo | P lo | A lo | >=A lo |
| US | US hi | PP | PP hi | P | P | A | >=A lo |
| US hi | PP lo | PP hi | P lo | P hi | P hi | A hi | >=A lo |

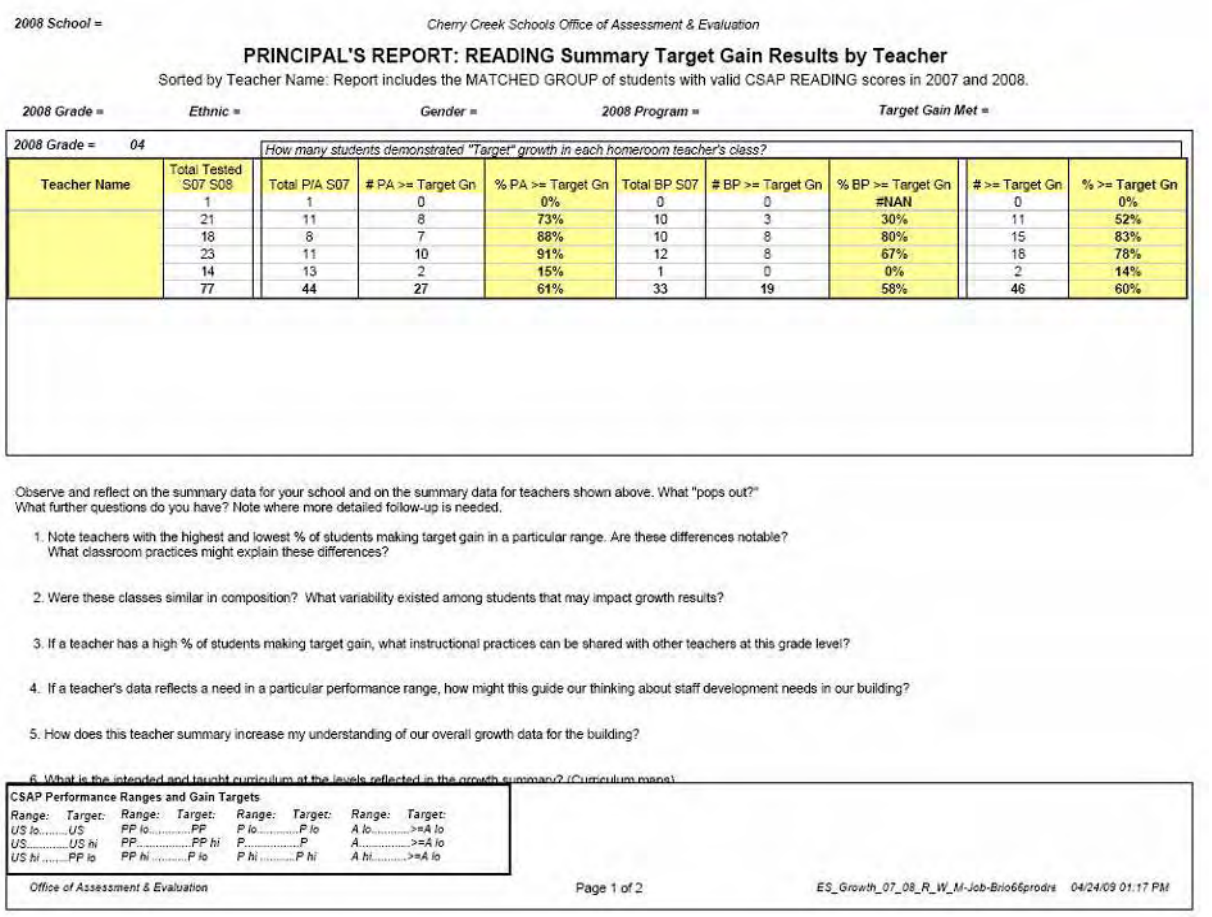
**CSAP READING Test Performance Level Scale Ranges by Grade Level**

| | TEST Gr. 3 | TEST Gr. 4 | TEST Gr. 5 | TEST Gr. 6 | TEST Gr. 7 | TEST Gr. 8 | TEST Gr. 9 | TEST Gr. 10 |
|---|---|---|---|---|---|---|---|---|
| US | 150-465 | 180-516 | 220-537 | 260-542 | 300-566 | 330-577 | 350-584 | 370-606 |
| PP | 466-525 | 517-571 | 538-587 | 543-599 | 567-619 | 578-631 | 585-641 | 607-662 |
| P | 526-655 | 572-670 | 588-690 | 600-695 | 620-715 | 632-723 | 642-738 | 663-746 |
| A | 656-756 | 671-940 | 691-955 | 696-970 | 716-980 | 724-990 | 739-995 | 747-999 |

*Office of Assessment & Evaluation* — Page 1 of 3 — *ES_Growth_07_08_R_W_M-Job-Brio66prodrepos 04/24/09 01:16 PM*

Similar data is provided for building administrators. They receive growth summaries for their school, grade levels, and for individual teachers. This allows them to compare the success of different teachers in helping students to meet their growth targets (Figure 7).

## Figure 7: Principals Growth Report



2008 School =

Cherry Creek Schools Office of Assessment & Evaluation

**PRINCIPAL'S REPORT: READING Summary Target Gain Results by Teacher**

Sorted by Teacher Name: Report includes the MATCHED GROUP of students with valid CSAP READING scores in 2007 and 2008.

2008 Grade = Ethnic = Gender = 2008 Program = Target Gain Met =

2008 Grade = 04

How many students demonstrated "Target" growth in each homeroom teacher's class?

| Teacher Name | Total Tested S07 S08 | Total P/A S07 | # PA >= Target Gn | % PA >= Target Gn | Total BP S07 | # BP >= Target Gn | % BP >= Target Gn | # >= Target Gn | % >= Target Gn |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 1 | 0 | 0% | 0 | 0 | #NAN | 0 | 0% |
| | 21 | 11 | 8 | 73% | 10 | 3 | 30% | 11 | 52% |
| | 18 | 8 | 7 | 88% | 10 | 8 | 80% | 15 | 83% |
| | 23 | 11 | 10 | 91% | 12 | 8 | 67% | 18 | 78% |
| | 14 | 13 | 2 | 15% | 1 | 0 | 0% | 2 | 14% |
| | 77 | 44 | 27 | 61% | 33 | 19 | 58% | 46 | 60% |

Observe and reflect on the summary data for your school and on the summary data for teachers shown above. What "pops out?" What further questions do you have? Note where more detailed follow-up is needed.

1. Note teachers with the highest and lowest % of students making target gain in a particular range. Are these differences notable? What classroom practices might explain these differences?
2. Were these classes similar in composition? What variability existed among students that may impact growth results?
3. If a teacher has a high % of students making target gain, what instructional practices can be shared with other teachers at this grade level?
4. If a teacher's data reflects a need in a particular performance range, how might this guide our thinking about staff development needs in our building?
5. How does this teacher summary increase my understanding of our overall growth data for the building?
6. What is the intended and taught curriculum at the levels reflected in the growth summary? (Curriculum maps)

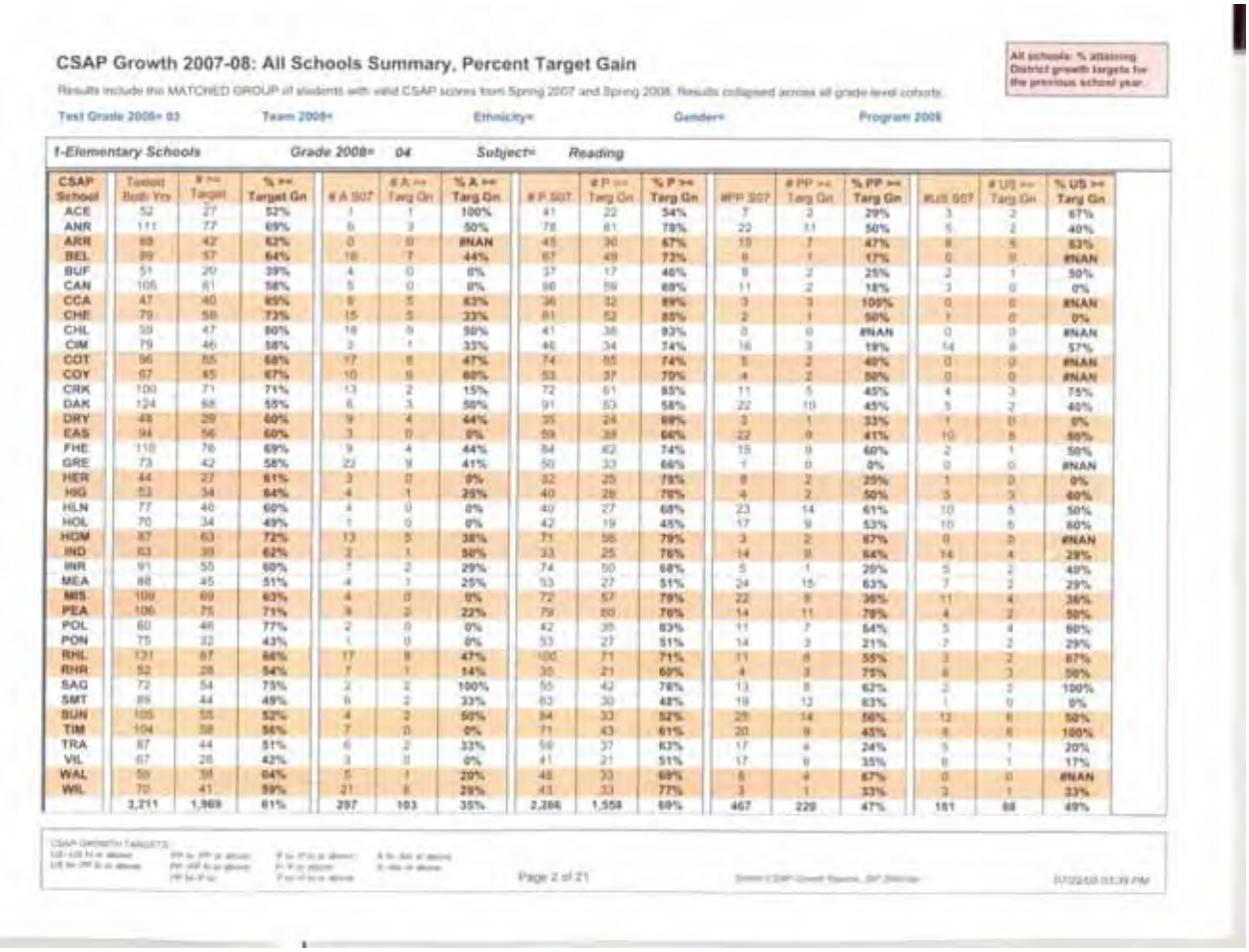
CSAP Performance Ranges and Gain Targets

| Range: | Target: | Range: | Target: | Range: | Target: | Range: | Target: |
|---|---|---|---|---|---|---|---|
| US lo | US | PP lo | PP | P lo | P lo | A lo | >=A lo |
| US | US hi | PP | PP hi | P | P | A | >=A lo |
| US hi | PP lo | PP hi | P lo | P hi | P hi | A hi | >=A lo |

Office of Assessment & Evaluation Page 1 of 2 ES_Growth_07_08_R_W_M-Job-Brio66prodrs 04/24/09 01:17 PM

Building administrators also receive district summaries showing the number and percentage of students who meet their growth targets at each school, disaggregated by performance level (Figure 8).

**Figure 8: District Summary of School Performance**



CSAP Growth 2007-08: All Schools Summary, Percent Target Gain

All schools: % attaining District growth targets for the previous school year.

Results include the MATCHED GROUP of students with valid CSAP scores from Spring 2007 and Spring 2008. Results collapsed across all grade-level cohorts.

Test Grade 2008= 03 Team 2008= Ethnicity= Gender= Program 2008

1-Elementary Schools Grade 2008= 04 Subject= Reading

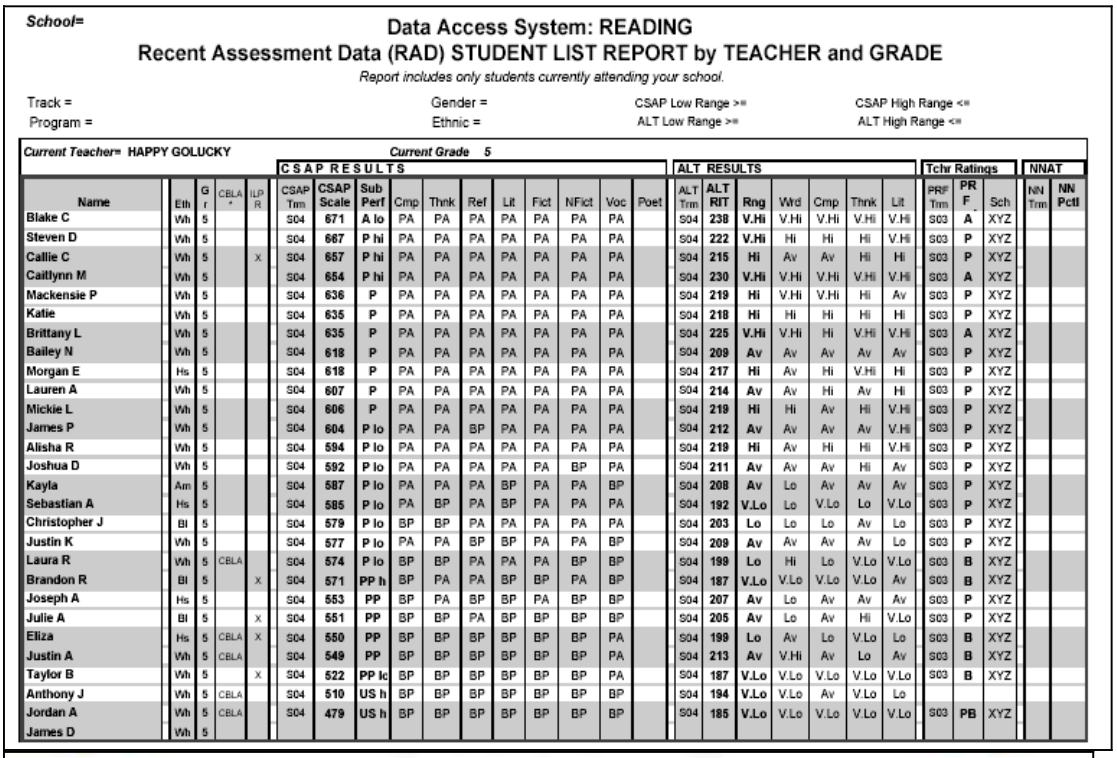
| CSAP School | Tested Both Yrs | # >= Target | % >= Target Gn | # A 507 | # A >= Targ Gn | % A >= Targ Gn | # P 507 | # P >= Targ Gn | % P >= Targ Gn | #PP 507 | # PP >= Targ Gn | % PP >= Targ Gn | #US 507 | # US >= Targ Gn | % US >= Targ Gn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACE | 52 | 27 | 52% | 1 | 1 | 100% | 41 | 22 | 54% | 7 | 2 | 29% | 3 | 2 | 67% |
| ANR | 111 | 77 | 69% | 6 | 3 | 50% | 78 | 61 | 78% | 22 | 11 | 50% | 5 | 2 | 40% |
| ARR | 68 | 42 | 62% | 0 | 0 | #NAN | 45 | 30 | 67% | 13 | 7 | 47% | 8 | 5 | 63% |
| BEL | 89 | 57 | 64% | 16 | 7 | 44% | 67 | 49 | 73% | 6 | 1 | 17% | 0 | 0 | #NAN |
| BUF | 51 | 20 | 39% | 4 | 0 | 0% | 37 | 17 | 46% | 8 | 2 | 25% | 2 | 1 | 50% |
| CAN | 105 | 61 | 58% | 5 | 0 | 0% | 88 | 59 | 68% | 11 | 2 | 18% | 3 | 0 | 0% |
| CCA | 47 | 40 | 85% | 6 | 5 | 83% | 36 | 32 | 89% | 3 | 3 | 100% | 0 | 0 | #NAN |
| CHE | 70 | 50 | 73% | 15 | 5 | 33% | 51 | 52 | 85% | 2 | 1 | 50% | 1 | 0 | 0% |
| CHL | 59 | 47 | 80% | 18 | 9 | 50% | 41 | 38 | 93% | 0 | 0 | #NAN | 0 | 0 | #NAN |
| CIM | 79 | 46 | 58% | 3 | 1 | 33% | 46 | 34 | 74% | 16 | 3 | 19% | 14 | 8 | 57% |
| COT | 96 | 65 | 68% | 17 | 8 | 47% | 74 | 55 | 74% | 5 | 2 | 40% | 0 | 0 | #NAN |
| COY | 67 | 45 | 67% | 10 | 6 | 60% | 53 | 37 | 70% | 4 | 2 | 50% | 0 | 0 | #NAN |
| CRK | 100 | 71 | 71% | 13 | 2 | 15% | 72 | 61 | 85% | 11 | 5 | 45% | 4 | 3 | 75% |
| DAK | 124 | 68 | 55% | 6 | 3 | 50% | 91 | 53 | 58% | 22 | 10 | 45% | 5 | 2 | 40% |
| DRY | 48 | 29 | 60% | 9 | 4 | 44% | 35 | 24 | 69% | 3 | 1 | 33% | 1 | 0 | 0% |
| EAS | 94 | 56 | 60% | 3 | 0 | 0% | 59 | 39 | 66% | 22 | 9 | 41% | 10 | 5 | 50% |
| FHE | 110 | 76 | 69% | 9 | 4 | 44% | 84 | 62 | 74% | 15 | 9 | 60% | 2 | 1 | 50% |
| GRE | 73 | 42 | 58% | 22 | 9 | 41% | 50 | 33 | 66% | 1 | 0 | 0% | 0 | 0 | #NAN |
| HER | 44 | 27 | 61% | 3 | 0 | 0% | 32 | 25 | 78% | 8 | 2 | 25% | 1 | 0 | 0% |
| HIG | 53 | 34 | 64% | 4 | 1 | 25% | 40 | 28 | 70% | 4 | 2 | 50% | 5 | 3 | 60% |
| HLN | 77 | 46 | 60% | 4 | 0 | 0% | 49 | 27 | 55% | 23 | 14 | 61% | 10 | 5 | 50% |
| HOL | 70 | 34 | 49% | 1 | 0 | 0% | 42 | 19 | 45% | 17 | 9 | 53% | 10 | 6 | 60% |
| HOM | 87 | 63 | 72% | 13 | 5 | 38% | 71 | 56 | 79% | 3 | 2 | 67% | 0 | 0 | #NAN |
| IND | 63 | 39 | 62% | 2 | 1 | 50% | 33 | 25 | 76% | 14 | 9 | 64% | 14 | 4 | 29% |
| INR | 91 | 55 | 60% | 7 | 2 | 29% | 74 | 50 | 68% | 5 | 1 | 20% | 5 | 2 | 40% |
| MEA | 88 | 45 | 51% | 4 | 1 | 25% | 53 | 27 | 51% | 24 | 15 | 63% | 7 | 2 | 29% |
| MIS | 109 | 69 | 63% | 4 | 0 | 0% | 72 | 57 | 79% | 22 | 8 | 36% | 11 | 4 | 36% |
| PEA | 106 | 75 | 71% | 9 | 2 | 22% | 79 | 60 | 76% | 14 | 11 | 79% | 4 | 2 | 50% |
| POL | 60 | 46 | 77% | 2 | 0 | 0% | 42 | 35 | 83% | 11 | 7 | 64% | 5 | 4 | 80% |
| PON | 75 | 32 | 43% | 1 | 0 | 0% | 53 | 27 | 51% | 14 | 3 | 21% | 7 | 2 | 29% |
| RHL | 131 | 87 | 66% | 17 | 8 | 47% | 100 | 71 | 71% | 11 | 6 | 55% | 3 | 2 | 67% |
| RHR | 52 | 28 | 54% | 7 | 1 | 14% | 35 | 21 | 60% | 4 | 3 | 75% | 6 | 3 | 50% |
| SAG | 72 | 54 | 75% | 2 | 2 | 100% | 55 | 42 | 76% | 13 | 8 | 62% | 2 | 2 | 100% |
| SMT | 89 | 44 | 49% | 6 | 2 | 33% | 63 | 30 | 48% | 19 | 12 | 63% | 1 | 0 | 0% |
| SUN | 105 | 55 | 52% | 4 | 2 | 50% | 84 | 33 | 52% | 25 | 14 | 56% | 12 | 6 | 50% |
| TIM | 104 | 58 | 56% | 7 | 0 | 0% | 71 | 43 | 61% | 20 | 9 | 45% | 6 | 6 | 100% |
| TRA | 87 | 44 | 51% | 6 | 2 | 33% | 59 | 37 | 63% | 17 | 4 | 24% | 5 | 1 | 20% |
| VIL | 67 | 28 | 42% | 3 | 0 | 0% | 41 | 21 | 51% | 17 | 6 | 35% | 6 | 1 | 17% |
| WAL | 59 | 38 | 64% | 5 | 1 | 20% | 48 | 33 | 69% | 6 | 4 | 67% | 0 | 0 | #NAN |
| WIL | 70 | 41 | 59% | 21 | 6 | 29% | 43 | 33 | 77% | 3 | 1 | 33% | 3 | 1 | 33% |
| | 3,211 | 1,969 | 61% | 297 | 103 | 35% | 2,286 | 1,558 | 68% | 467 | 229 | 47% | 181 | 88 | 49% |

Page 2 of 21

In addition to the growth data, teachers also receive detailed information about their current students' most recent CSAP performance (e.g., performance level, standard and sub-content area scores). Building administrators are provided with teacher and building summaries of this kind of data.

Teachers and administrators are trained to interpret these data and use it for instruction planning and improvement. As part of that training, teachers are given graphic organizers that help them group students for instruction and log the specific strategies and interventions they used with individuals and groups of students during the year (Figure 9). They are also encouraged to use the organizer to monitor the progress of students. This process enables them to reflect on the effectiveness of particular instructional approaches in promoting student growth when they receive their growth data for the previous year.

## Figure 9: Tools for Tracking Interventions



School=

**Data Access System: READING**

**Recent Assessment Data (RAD) STUDENT LIST REPORT by TEACHER and GRADE**

*Report includes only students currently attending your school.*

Track = Gender = CSAP Low Range >= CSAP High Range <=

Program = Ethnic = ALT Low Range >= ALT High Range <=

Current Teacher= HAPPY GOLUCKY Current Grade 5

| | | | | | CSAP RESULTS | | | | | | | | | | | ALT RESULTS | | | | | | | Tchr Ratings | | | NNAT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | Eth | Gr | CBLA * | ILP R | CSAP Tm | CSAP Scale | Sub Perf | Cmp | Thnk | Ref | Lit | Fict | NFict | Voc | Poet | ALT Tm | ALT RIT | Rng | Wrd | Cmp | Thnk | Lit | PRF Tm | PR F | Sch | NN Tm | NN Pctl |
| Blake C | Wh | 5 | | | S04 | 671 | A lo | PA | PA | PA | PA | PA | PA | PA | | S04 | 238 | V.Hi | V.Hi | V.Hi | V.Hi | V.Hi | S03 | A | XYZ | | |
| Steven D | Wh | 5 | | | S04 | 667 | P hi | PA | PA | PA | PA | PA | PA | PA | | S04 | 222 | V.Hi | Hi | Hi | Hi | V.Hi | S03 | P | XYZ | | |
| Callie C | Wh | 5 | | X | S04 | 657 | P hi | PA | PA | PA | PA | PA | PA | PA | | S04 | 215 | Hi | Av | Av | Hi | Hi | S03 | P | XYZ | | |
| Caitlynn M | Wh | 5 | | | S04 | 654 | P hi | PA | PA | PA | PA | PA | PA | PA | | S04 | 230 | V.Hi | V.Hi | V.Hi | V.Hi | V.Hi | S03 | A | XYZ | | |
| Mackensie P | Wh | 5 | | | S04 | 636 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 219 | Hi | V.Hi | V.Hi | Hi | Av | S03 | P | XYZ | | |
| Katie | Wh | 5 | | | S04 | 635 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 218 | Hi | Hi | Hi | Hi | Hi | S03 | P | XYZ | | |
| Brittany L | Wh | 5 | | | S04 | 635 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 225 | V.Hi | V.Hi | Hi | V.Hi | V.Hi | S03 | A | XYZ | | |
| Bailey N | Wh | 5 | | | S04 | 618 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 209 | Av | Av | Av | Av | Av | S03 | P | XYZ | | |
| Morgan E | Hs | 5 | | | S04 | 618 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 217 | Hi | Av | Hi | V.Hi | Hi | S03 | P | XYZ | | |
| Lauren A | Wh | 5 | | | S04 | 607 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 214 | Av | Av | Hi | Av | Hi | S03 | P | XYZ | | |
| Mickie L | Wh | 5 | | | S04 | 606 | P | PA | PA | PA | PA | PA | PA | PA | | S04 | 219 | Hi | Hi | Av | Hi | V.Hi | S03 | P | XYZ | | |
| James P | Wh | 5 | | | S04 | 604 | P lo | PA | PA | BP | PA | PA | PA | PA | | S04 | 212 | Av | Av | Av | Av | V.Hi | S03 | P | XYZ | | |
| Alisha R | Wh | 5 | | | S04 | 594 | P lo | PA | PA | PA | PA | PA | PA | PA | | S04 | 219 | Hi | Av | Hi | Hi | V.Hi | S03 | P | XYZ | | |
| Joshua D | Wh | 5 | | | S04 | 592 | P lo | PA | PA | PA | PA | PA | BP | PA | | S04 | 211 | Av | Av | Av | Hi | Av | S03 | P | XYZ | | |
| Kayla | Am | 5 | | | S04 | 587 | P lo | PA | PA | PA | BP | PA | PA | BP | | S04 | 208 | Av | Lo | Av | Av | Av | S03 | P | XYZ | | |
| Sebastian A | Hs | 5 | | | S04 | 585 | P lo | PA | BP | PA | BP | PA | PA | PA | | S04 | 192 | V.Lo | Lo | V.Lo | Lo | V.Lo | S03 | P | XYZ | | |
| Christopher J | Bl | 5 | | | S04 | 579 | P lo | BP | BP | PA | PA | PA | PA | PA | | S04 | 203 | Lo | Lo | Lo | Av | Lo | S03 | P | XYZ | | |
| Justin K | Wh | 5 | | | S04 | 577 | P lo | PA | PA | BP | BP | PA | PA | BP | | S04 | 209 | Av | Av | Av | Av | Lo | S03 | P | XYZ | | |
| Laura R | Wh | 5 | CBLA | | S04 | 574 | P lo | BP | BP | PA | PA | PA | BP | BP | | S04 | 199 | Lo | Hi | Lo | V.Lo | V.Lo | S03 | B | XYZ | | |
| Brandon R | Bl | 5 | | X | S04 | 571 | PP h | BP | PA | PA | BP | BP | PA | BP | | S04 | 187 | V.Lo | V.Lo | V.Lo | V.Lo | Av | S03 | B | XYZ | | |
| Joseph A | Hs | 5 | | | S04 | 553 | PP | BP | PA | BP | BP | PA | BP | BP | | S04 | 207 | Av | Lo | Av | Av | Av | S03 | P | XYZ | | |
| Julie A | Bl | 5 | | X | S04 | 551 | PP | BP | BP | PA | BP | BP | BP | BP | | S04 | 205 | Av | Lo | Av | Hi | V.Lo | S03 | P | XYZ | | |
| Eliza | Hs | 5 | CBLA | X | S04 | 550 | PP | BP | BP | BP | BP | BP | BP | PA | | S04 | 199 | Lo | Av | Lo | V.Lo | Lo | S03 | B | XYZ | | |
| Justin A | Wh | 5 | CBLA | | S04 | 549 | PP | BP | BP | BP | BP | BP | BP | PA | | S04 | 213 | Av | V.Hi | Av | Lo | Av | S03 | B | XYZ | | |
| Taylor B | Wh | 5 | | X | S04 | 522 | PP lc | BP | BP | BP | BP | BP | BP | PA | | S04 | 187 | V.Lo | V.Lo | V.Lo | V.Lo | V.Lo | S03 | B | XYZ | | |
| Anthony J | Wh | 5 | CBLA | | S04 | 510 | US h | BP | BP | BP | BP | BP | BP | BP | | S04 | 194 | V.Lo | V.Lo | Av | V.Lo | Lo | | | | | |
| Jordan A | Wh | 5 | CBLA | | S04 | 479 | US h | BP | BP | BP | BP | BP | BP | BP | | S04 | 185 | V.Lo | V.Lo | V.Lo | V.Lo | V.Lo | S03 | PB | XYZ | | |
| James D | Wh | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |

**Using Data to Guide Instruction**

**Teacher's Instructional Planning Worksheet**

**Cherry Creek School District**

**Teacher & Grade:** Happy Go-Lucky

**School:** Anywhere Elementary

**Current Date:** 9/15/2005

**Students Identified for Targeted Intervention:** (see attached RAD list, CSAP Standards Rank Order list, or ALT Goal Rank Order List)

Joseph, Julie
Eliza, Justin
Taylor, Anthony
(Jordan)

**General Content Area** (Circle One): READING WRITING MATH SCIENCE

**Area of Focus Within Content Area:** (e.g., Standard, Goal Area, SubContent Area, Benchmark Area)

Standard 1/Comprehension/Non-fiction

**Area of Focus Assessed with:**

CSAP/ALT/Written Retell

**Intervention Strategy/Strategies Applied:**

Identify strategy/strategies and dates implemented. Note observation comments about impact on student learning.

| Date | Strategy | Observation Comments: |
|---|---|---|
| 10/6- 10/10 & 10/17- 10/23 | Student marked and coded text in all content areas. | Walked around and noted students' ability to mark and code text with accurate follow-thru of the directions. I selected an abbreviated reading on the planets during our science block to help my students feel more successful as they began to apply this practice in other subject areas. Jordan is struggling with the task. Eliza seems to be gaining confidence as an independent reader. |

| Date | Assessment Type | Observation Comments: |
|---|---|---|
| 10/17 11/21 | Short non-fiction reading & comprehension questions. | Students were asked to code text before they answered the questions. Comprehension question responses were "overall" more accurate. Target group scores fell in 2+-3 range. (4 pt. Rubric). Jordan needs to be in the reading lab during quarters 3 & 4. |

**Follow-up Meeting Dates between principal and teacher to discuss target plan and Student Performance progress (Names of Student(s), Date.**

Date: 9/27/2005 Date: 1/11/2006

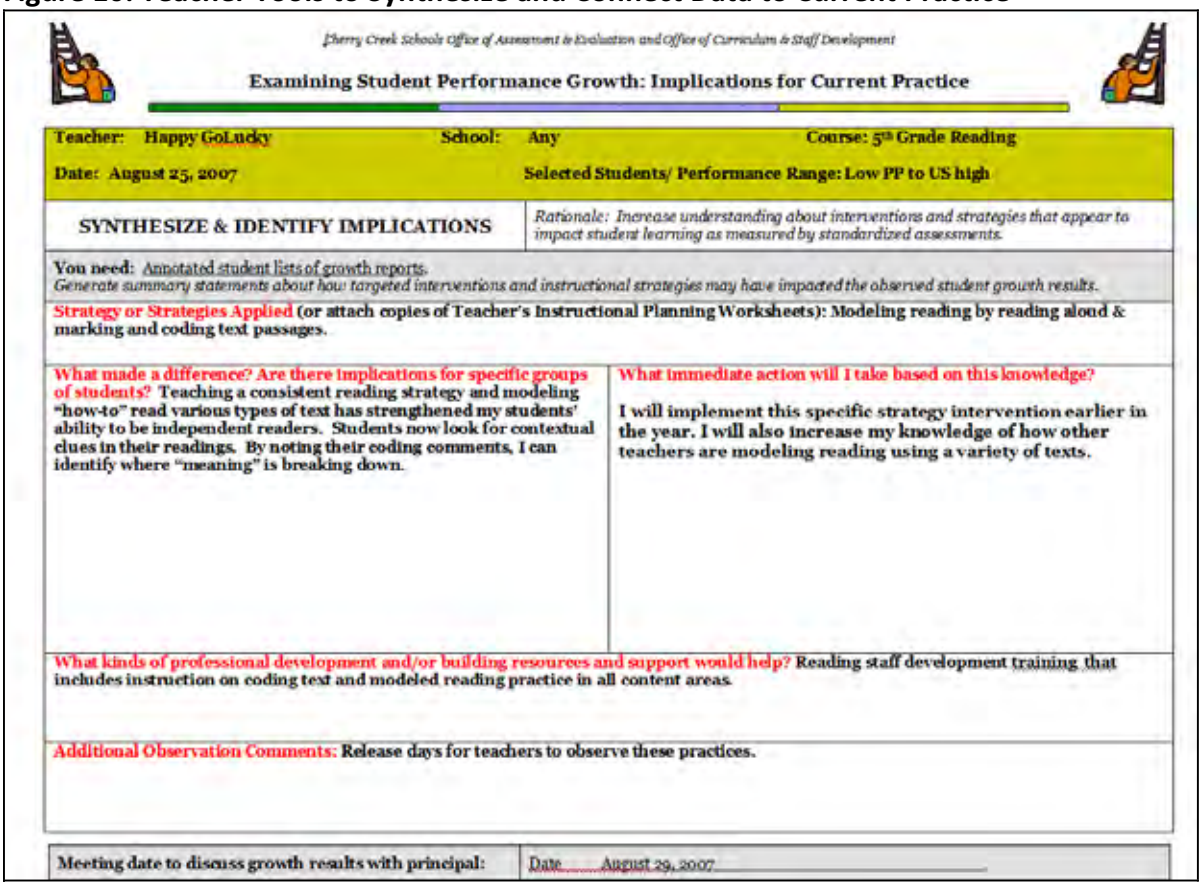
Date: 10/13/2005 Date:

## Informing Instruction

Informing instruction involves using data about students' performance over the past year to inform instruction in the short term for particular individuals and groups of students in this year's classes. These data also enable teachers to reflect on past practice to improve the teacher's overall instructional effectiveness.

In Cherry Creek, teachers typically receive the CSAP data for their current students and the growth data for last year's classes by the second week of August (a week or so before school starts). During the previous year they have used CSAP data (and other assessment information) to plan for instruction and group students by similar need. In addition, they have "mapped" the instructional interventions and strategies they have used with individuals and groups of students over the course of the year using the graphic organizers provided in training (Figure 10). Thus, they have a record of those interventions, where they were used and for how long.

**Figure 10: Teacher Tools to Synthesize and Connect Data to Current Practice**



*Cherry Creek Schools Office of Assessment & Evaluation and Office of Curriculum & Staff Development*

**Examining Student Performance Growth: Implications for Current Practice**

| | | |
|---|---|---|
| **Teacher:** Happy GoLucky | **School:** Any | **Course:** 5th Grade Reading |
| **Date:** August 25, 2007 | **Selected Students/ Performance Range:** Low PP to US high | |

**SYNTHESIZE & IDENTIFY IMPLICATIONS**

*Rationale: Increase understanding about interventions and strategies that appear to impact student learning as measured by standardized assessments.*

**You need:** Annotated student lists of growth reports.
*Generate summary statements about how targeted interventions and instructional strategies may have impacted the observed student growth results.*

**Strategy or Strategies Applied (or attach copies of Teacher's Instructional Planning Worksheets):** Modeling reading by reading aloud & marking and coding text passages.

**What made a difference? Are there implications for specific groups of students?** Teaching a consistent reading strategy and modeling "how-to" read various types of text has strengthened my students' ability to be independent readers. Students now look for contextual clues in their readings. By noting their coding comments, I can identify where "meaning" is breaking down.

**What immediate action will I take based on this knowledge?**

I will implement this specific strategy intervention earlier in the year. I will also increase my knowledge of how other teachers are modeling reading using a variety of texts.

**What kinds of professional development and/or building resources and support would help?** Reading staff development training that includes instruction on coding text and modeled reading practice in all content areas.

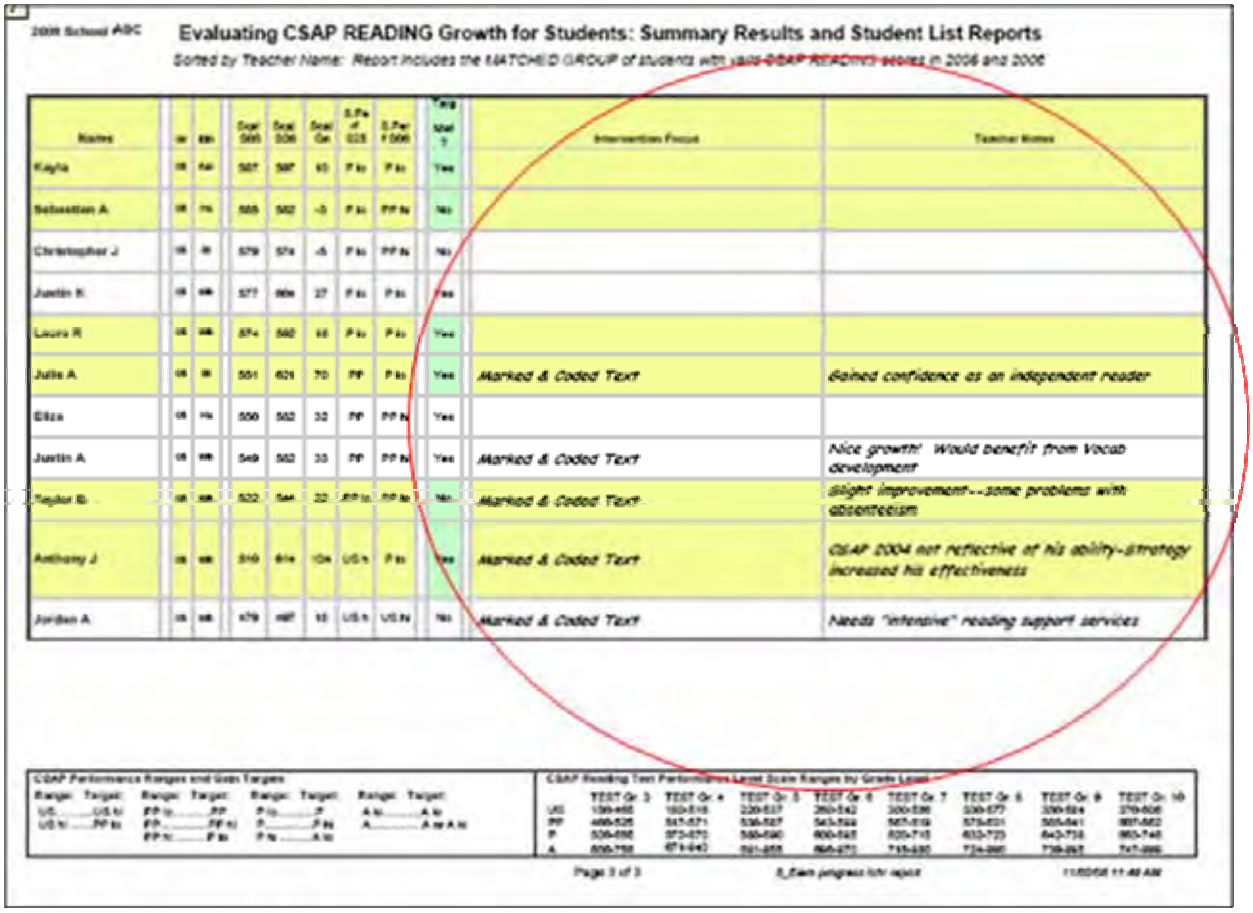
**Additional Observation Comments:** Release days for teachers to observe these practices.

**Meeting date to discuss growth results with principal:** Date August 29, 2007

Before examining their growth data, teachers review the CSAP results for the students who will be in their class(es) this year and make notes about how to group them for instruction in a particular subject area. The next step is to examine the growth of individuals and groups of students the teacher had last year in light of the particular interventions used with these students. The goal is to identify which interventions seemed to be associated with high growth for which students and which did not appear to have much impact on student growth (Figure 10). This will inform instruction for the teacher's current classes. Obviously, teachers will continue to utilize those strategies/interventions that were effective in increasing student achievement and stop

using or modify those that did not. The teacher uses this information in conjunction with CSAP and other assessment data about her current group of students to identify student needs and plan instructional strategies to meet these needs. Knowing "what worked" for last year's students and what didn't helps the teacher be more efficient and effective with this year's class(es). Without the ability to link the achievement of specific students to a particular teacher, these kind of analyses would not be possible.

**Figure 10: Tools for Linking Results to Instructional Practice**




In using the data on their students to examine their overall instructional program, teachers usually begin by focusing on differences in growth across performance levels. For example, they might explore differences in growth between students who scored below proficient level last year and those who started out in the above proficient range looking for differences in the percent of students who met their growth targets. The next step would be to look at differences in meeting growth goals across each performance level to determine whether they were more effective with students in a particular score range. Because closing the achievement gap is a primary goal for the district, the differences in growth across racial groups are a particular area of focus. As part of this process, they would be asked to highlight or note how many students declined and improved in each performance level and identify any differences in the percent of students meeting their growth targets across racial groups. Teachers are given a set of guiding questions to help them work through this process (Figure 6).

Another means for identifying the effectiveness of instructional strategies is to explore the difference between actual student performance and growth and teacher predictions. Teachers look for patterns among "outliers" (large differences between teacher prediction and student performance) at the class level and for groups of students and individuals.

They are trying to identify whether this is a testing issue or an instructional/curricular problem. If it is a testing problem they can take steps to rectify that situation during the next round of assessment. If it is not due to a "bad test day," then they begin the process examining the types of interventions/strategies that they employed with these students in an effort to understand why they were not as effective as they had originally believed.

## Examining Teacher and School Effectiveness

Besides improving instruction, the use of a teacher identifier also enables teachers and building administrators to examine relative teacher effectiveness. Teachers examine the growth summaries for their classes in light of the growth of students of other teachers in their school and across the district. This gives the teacher a way to benchmark her scores against others who teach the same subject at the same grade level. Given training and appropriate cultural norms, this leads to highly productive discussions between teachers, and teachers and administrators about why they got the results they did and helps to identify those teachers that everyone can learn from.

Building administrators review the building growth summary reports for their level (Figure 8). They engage in a similar process with their colleagues and supervisor, benchmarking the growth of their students compared to all schools at their level, as well as those with similar demographic characteristics. Principals meet with colleagues from schools with relatively the same level of racial and economic diversity to investigate root causes for their results and identify possible means for improvement.

## Setting Improvement Goals

Another important use of the data available from a unique teacher identifier is setting goals for improvement. Once a teacher has reviewed her previous year's students' growth and performance, and discussed her students' results with her peers and supervisor, she can use that data to set goals. This might involve a goal for the growth of the entire class (e.g., the median growth percentile for the class as a whole will increase by a specific number) or it could focus on students in a particular performance level or with similar demographic characteristics. Teachers could also set goals as a grade level or subject area team (e.g., Algebra 1 teachers).

The availability of data by teacher provides important context for the goal-setting process. Knowing the kind of growth and performance that her colleagues have obtained allows a teacher to set high, but achievable goals for improvement that meet an "existence" standard. That is, the goal is possible because others in the system have shown it can be done.

Building administrators can use the contextual information provided by "teacher identifier data" to help teachers set meaningful goals for student performance. In turn, these data also help them to set realistic and challenging school level goals.

## Challenges

The challenges to using this kind of data are both technical and cultural. The technical challenges involve statistical and technological issues. The cultural challenges have to do with the nature of the teaching profession.

There are a number of statistical/measurement challenges to using the kind of data generated from the use of a teacher identifier referred to in this paper. Some of these are due to the nature of large-scale testing in Colorado—making Colorado similar to most other states. First, because only certain grades and subjects are tested, the data are not relevant to a number of "non-CSAP" teachers. A number of teachers can use the CSAP data (especially reading and writing results) to inform instruction, but only specific teachers have a direct impact on the scores. As a result, there is simply no immediately relevant data for a number of teachers. It can also be problematic to determine which teacher "owns" the data. For example, many elementary schools have become departmentalized (especially in the intermediate grades). One or two teachers may teach math or science to the entire grade level. Unless that information is known before the data are analyzed, student performance may be linked to the wrong teachers. A similar situation exists at the secondary level for reading and writing. That is, unless a student is in a remedial class for those subjects, no one specifically teaches reading and writing, except in the context of a subject matter course. Therefore, it is difficult to determine who is directly accountable for reading and writing scores.

Another technical challenge is to get these data to teachers in a meaningful way. In order for teachers to use this kind of information, they must have access to it and be trained to interpret it. Ideally, teachers should be able to view these data from their desktops and have links to the tools they need to make meaning of it. In addition, they need opportunities to learn what the data mean, coaching and follow-up support to use it in their practice, and a level of supervision and accountability from the principal for using the data as intended.

Unfortunately, there are cultural barriers to creating a unique teacher identifier and using it to link large scale data to specific teachers. The profession itself does not have a consistent norm of continuous improvement. Most teacher evaluation systems don't meaningfully differentiate between levels of performance. Teachers are either "perfect" or they are "incompetent" with little middle ground. The perfect teachers don't need to improve and the incompetent teachers are removed. Therefore, there is no sense of urgency for data about the performance of one's own students and a fear of looking at the performance of one's students in comparison to that of other teachers. This stifles improvement efforts and creates a buffer between teachers, their colleagues, and supervisors.

Overcoming these cultural barriers requires training, sensitivity on the part of administrators, and most importantly, trust among teachers, and teachers and administrators. It starts with an organizational culture of continuous improvement that sets norms for using data and provides the support to do so. Without this cultural context, fear and resistance to change will derail efforts to create and use this very valuable data source.

## Summary

The purpose of this paper was to illustrate the ways in which data generated from the use of a unique teacher identifier to link student performance with individual teachers could be used to improve instruction and student achievement. As could be seen from these examples, the nature of this work was improvement, professional development, and support—efforts that are grounded in positive intent. None of the uses of this kind of data suggested here were negative. That is, there was no hidden agenda to use the teacher identifier to somehow punish teachers. Rather, it was the complete opposite.

The use of a teacher identifier can be a valuable tool in producing data that can empower teachers to improve their practice and the outcomes for students. It can be the stimulus for the development of knowledge and wisdom. That is to say, data are just a collection of facts. It becomes information when it is organized into a chart or report. It becomes knowledge when teachers interact with it and each other around the information. Finally, wisdom is generated when teachers bring their expertise and experience to bear on the knowledge they have gained to take action to improve. In Cherry Creek Schools, using data generated from the use of a teacher identifier is at the heart of our improvement efforts. Without this information, it would be difficult to improve.

# National Trends

# Linking Evidence to Practice: Data Systems That Can Be Used to Improve Teaching and Learning

*By Dan Goldhaber, Ph.D., University of Washington*

## The Potential of a Continuous Learning System

Although there is room for disagreement, many observers of public education conclude that U.S. schools have failed over a long period of time to systematically adopt and maintain productivity-enhancing policies and practices. Consequently, advances in aggregate student achievement have been frustratingly slow, despite significant increases in educational investments.[1] This situation is not a result of a failure to try new educational approaches: most schools are all too familiar with the term "reform du jour."[2] Rather, I would contend that it is because the U.S. schools are not bound up in what one might think of as a continuous learning system. There are many possible explanations for why this is so. Politics and capacity constraints certainly contribute the problem, but one of the most important arguments for why we do not have a continuous learning system that leads to systematic productivity advancement is that K-12 education has failed to take advantage of the potential of data to answer key resource and policy questions. Consequently, decision-making is often not pushed by rigorous empirical evidence in directions that lead to productivity improvements.

What might policymakers wish to know when debating reforms and allocating scarce resources? It is certainly reasonable to ask education-focused questions like: Do the standards for licensure dissuade talented people from seeking a career in teaching, or are they an important means of guaranteeing that teachers have minimal requisite skills before entering classrooms? How well are investments in school reform models working and are they more cost-effective than other types of investments (like class-size reduction) in increasing student achievement? Do new teacher compensation experiments impact teacher attrition or student learning?

More generally, policymakers might wish to link school-related health and human service investments to schooling outcomes, or schooling investments to post-secondary education and labor market behavior, yielding such questions as: Do investments in child nutritional and health services improve student learning? How do different types of public schools or schooling arrangements (such as traditional and charter schools, or jump-start programs) affect the

[1] Much of the increase in per-pupil spending has gone to reduce class sizes.

[2] Although one might make a good case that the range of approaches to teaching students has been limited due to political and/or resource constraints. For example, see Goldhaber and Hannaway (Forthcoming, 2009), for a presentation and discussion of ideas about more fundamental reforms of the human capital systems that govern the development and treatment of the nation's teacher workforce.

likelihood that students go on to college or impact labor market outcomes like employment and earnings?

In principal, all of these questions are knowable. In fact, as I briefly describe below, we are beginning to learn quite a bit about many of these issues. But answering these types of questions often requires time (especially in cases where the questions relate to investments at one point in an individual's life and outcomes in another, such as the impacts of investments in maternal and infant health on schooling) and resources. And, the answers often challenge powerful constituency groups.

So, with that as a backdrop, it is not surprising that changes to policy are too often made in the absence of convincing (and sometimes any) empirical work that might shed light on the efficacy of proposed changes. Consequently, more often than not it is the political tune of the day that holds sway when important policy debates are taking place. Or, even when compelling evidence does exist, politics often trumps good research. While the issue of politics is quite important, here I focus on the connection between data and our understanding of educational policies and investments. I begin by reviewing what we have learned about the educational system based on the availability of new state databases, then go on to discuss the key elements of these data systems that enable high-quality research. I conclude with some final thoughts and recommendations for moving forward.

## The Power of New Data Systems to Inform Policy

It is only since the mid-1990s that state databases have evolved such that they include the data elements and structures necessary for conducting the kinds of quantitative analyses that can be used to answer questions about educational systems in rigorous ways. The key elements that state systems need to possess in order to be useful in answering a full range of educational policy questions, have been described in a number of documents by the Data Quality Campaign (DQC).[3] I won't go into great detail here, but it is worth noting the 10 "essential" elements that the DCQ highlights as crucial for state longitudinal data systems:

1. A unique statewide student identifier that connects student data across key databases across years;
2. Student-level enrollment, demographic, and program participation information;
3. The ability to match individual students' test records from year to year to measure academic growth;
4. Information on untested students and the reasons they were not tested;
5. A teacher identifier system with the ability to match teachers to students;
6. Student-level transcript information, including information on courses completed and grades earned;
7. Student-level college readiness test scores;
8. Student-level graduation and dropout data;
9. The ability to match student records between the P–12 and higher education systems;
10. A state data audit system assessing data quality, validity and reliability[4]

[3] More comprehensive information on the specifics of such data structures can be found at the DQC website: http://www.dataqualitycampaign.org/.

[4] Today, most state data systems have at least some of these key elements, but only four have all ten.

I would argue that one of the most important characteristics of state databases is the ability to link individual students to their teachers and track both over time.[5] Some policies and interventions can and have been assessed without this link, but often not in an empirically convincing way[6].

Perhaps more importantly, it is difficult (if not impossible) to assess *teacher-level* interventions without knowing precisely which teachers teach which students. For example, if teachers receive professional development and we are trying to assess whether it makes them more productive, one needs to know not only which teachers received it, but also which students were potentially impacted by those teachers. And, assessments of teacher impact require a counterfactual or comparison group – meaning that we also need to have information on teachers who did *not* receive the professional development we are interested in studying.

A striking finding that has come to light precisely from studies utilizing state administrative data is that individual teachers can have profound impacts on student achievement but there is also tremendous variation in the workforce in terms of the effectiveness of individual teachers.[7] This line of research has also shown that credentials like teacher certification or degree level are only weak predictors, at best, of teacher effectiveness. I would contend that studies showing the impact of individual teachers on students and the variation of effectiveness amongst teachers who hold the same credential were instrumental in shifting the national focus in this decade toward investigating policy options for improving teacher quality (as opposed to, for instance, lowering class sizes or whole school reform models), and, in particular, policies that are focused on the quality of individual teachers in the workforce (such as pay for performance) as opposed to the requirements to enter the workforce.

From a statistical standpoint, the link between students and their teachers is essential if one wants to estimate *teacher-level* "value-added models" (VAM)—that is, statistical models that attempt to isolate the impact of various educational variables (or the impact of individual teachers) from other factors that influence student achievement, like a student's prior "level" of achievement.[8]

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[5] As of 2008, twenty-one states have systems that allow teachers to be matched to the students they teach and their achievement on state assessments (McNeil, 2008), but only a select few appear to be using this data in ways that shed light on the efficacy of educational programs and policies.

[6] This is true of many older "educational production function" studies (see Hanushek, 1986, for an overview of these) that were done linking school-level measures of student achievement (for example, student test scores averaged to the school level) and school-level measures of school resources (such as the percentage of teachers with master's degrees). Research strongly suggests that these aggregate-level studies tend to produce inflated relationships between educational resources and student achievement (Hansuhek et al., 1996). Moreover, as we have learned more about the impacts of schooling on students, it is clear that educational investments in such things as class size (Krueger, 1999) or teacher quality (Goldhaber and Anthony, 2007) have differential impacts on students from different backgrounds. Since there is often considerable variation within schools in the allocation of educational resources, analyses using school aggregates can be problematic because they miss the impacts on student subgroups. It is only when good information exists about the match of teachers and students that we truly know how equitably students are distributed across teachers who hold different skills or qualifications (Goldhaber, 2008a). Advocacy groups like Education Trust have made clear that the distribution of teachers over students appears to be quite inequitable.

[7] See, for instance, Rivkin et al. (2005) using data from Texas and Sanders et al. (1997) using data from Tennessee.

[8] For more information on value-added models, see Hanushek (1979) or McCaffrey et al. (2004, 2008).

At a minimum, credible VAM estimates require information on student achievement over multiple years, preferably annually in subsequent grades; student background information such as measures of socio-economic status (SES) and learning and English proficiency status; and the ability to link schooling resources (such as teacher characteristics or class size) to *individual* students – so that researchers know, for instance, students' actual class sizes rather than just the average student-teacher ratio in a school – in the years for which the achievement data are available.[9]

Longitudinal student-teacher data can permit (depending on the number of years of data available) the estimation of more sophisticated statistical models that help researchers avoid the student-teacher matching problems frequently plaguing many educational production function studies. In particular, when analyzing non-experimental data, researchers worry that the relationship between two (or more) variables thought to be causal is in fact simply a statistical artifact. For instance, if it were the case that struggling students were assigned primarily to the most-senior teachers, we would likely observe a negative relationship between teacher experience and student achievement. This, however, does not necessarily mean that teachers become less effective as they gain more experience, rather it may simply reflect the student assignment process.

In the above hypothetical case, the "bias" in the estimated impact of teacher experience on student achievement is due to the fact that the non-random matching of students and teachers has not been properly accounted for. In practice, students who are struggling tend to be assigned to less-experienced and less-credentialed teachers; this leads to an overestimate of the impacts of teacher credentials in conventional statistical analyses. This is aptly illustrated by new research from Clotfelter et al. (2006) and Goldhaber (2007a), who, using state administrative data from North Carolina, test whether unobservable characteristics cause systematic bias in the estimated effects of observable variables.

We've actually learned a great deal about teachers and teacher characteristics from state databases. For example, as commonsense would suggest, fairly definitive evidence now exists that teachers tend to improve with additional experience but only in the early part (the first 3 to 5 years) of their careers. But, research sometimes contradicts widely help conceptions. For instance, it would likely come as a surprise to many readers that a teacher having an advanced degree does not in general predict how effective they are in the classroom.[10]

A less-extensive body of evidence suggests that teachers who perform better on licensure tests are more effective in the classroom (Clotfelter et al., 2006; Goldhaber, 2007b); that those who enter the profession through the well known alternative program *Teach For America* are often quite effective (Boyd et al., 2006; Kane et al., 2006); and that licensure exam performance does predict teacher effectiveness (Goldhaber, 2007b). Finally, there is mixed evidence on the impact of teachers who hold an advanced teaching certificate issued by the National Board for Professional Teaching Standards (Harris and Sass, 2008; Goldhaber, 2006). Finally, new

[9] For a more comprehensive discussion of these issues, see Hanushek (1986) or Goldhaber and Brewer (1997).

[10] For more detail on the relationship between teacher experience, degrees, and student achievement, see studies by Clotfelter et al. (2006), Goldhaber, (2007b), Harris and Sass (2007), Kane et al. (2006) Rivkin et al. (2005), Rockoff (2004).

research (Boyd et al., 2008) is beginning to identify the specific aspects of teacher training that are efficacious.[11]

Perhaps more important than the findings about individual teacher characteristics is the finding that, even when a particular characteristic is a significant predictor of student achievement, there is substantial overlap in the estimated effectiveness of those with and without that characteristic. This finding has led some policymakers and researchers to call for a shift away from credentials-based teacher policies (like licensure) typically used in determining teacher employment eligibility and compensation, and in the direction of policies that judge *individual* teachers based on estimates of their value-added contribution toward student achievement (see, for instance, Gordon et al., 2006). This, of course, cannot be done in the absence of high-quality data systems that include most, if not all, of the elements outlined by the Data Quality Campaign.

One of the very striking things about new studies of teacher effects is the fact that virtually all are based on data from a select few states: Florida, New York (NYC specifically), North Carolina, and Texas. Other states have the ability to longitudinally link students and teachers, but this is obviously not a sufficient condition to ensure that relevant policy research is conducted. States must have both the right data systems and the desire to release data for policy research. This raises two thorny issues: the politics of education data, and the protection of individual privacy rights (for students and teachers).

When it comes to politics, the primary concern about linking teachers to their students and releasing this information is most likely that policymakers will do precisely what has been suggested above, and craft policies that make judgments about individual teachers based on statistical estimates of their contributions toward student learning. For example, one might use information about individual teacher effectiveness for high-stakes policy purposes, such as tenure determination or pay for performance.

The two major teacher unions oppose these policies, so debates about creating data systems that would enable the implementation of such policies get confounded with debates about the enactment of the policies themselves.[12] In point of fact, there are important *potential* limits to the use of student assessment information for making high-stakes decisions about, for instance, teacher tenure or pay (Goldhaber and Hansen, 2008; Sass, 2008). While the use of VAM for teacher policy may ultimately be efficacious, we are only just beginning to understand the implications of this idea. What's more, the cases where VAM offers the potential to evaluate teachers are limited, since less than a quarter of teachers are teaching in grades that are tested annually (so that one can measure achievement *gains*). Regardless, it is quite unfortunate that fears over the potential misuse of data sometimes impede our learning about what does or does not work to improve student learning.

A second issue that often impedes the release of data linking teachers and students, and hence research, is concern over individual privacy, and, in particular, the *Privacy and the Family Educational Research Protection Act* (FERPA). An in-depth discussion of this issue is beyond the scope of this paper, but I would urge those who wish to know more about FERPA and its

[11] For more details on specific studies see Goldhaber (2008b).

[12] For a more comprehensive discussion of the politics associated with teacher pay reforms, see Goldhaber (2008).

implications for releasing data to visit the Data Quality Campaign website (www.dataqualitycampaign.org) and also "A Byte at the Apple" by Dougherty, which can be accessed from (www.edexcellence.net/). And it is important to know that states *can* provide linked teacher-student data while preserving the confidentiality of students and teachers by developing a data coding system where each student and teacher in the public school system is assigned a unique identification number. Researchers are not generally concerned with knowing *who* specific teachers and students are; rather, for research purposes, they need to know the *characteristics* of teachers and their students and which policies and programs apply to each.

## Conclusions

I have focused here mainly on the importance of individual teacher-student links, but like roads, datasets become increasingly valuable the more that they join various sources of information together. Thus, for example, to the extent that K-12 schooling data are linked to students' pre-kindergarten and post high-school graduation experiences, we can learn a great deal more about the complex relationships that exist between social services, K-12 schooling, and post-schooling outcomes. This is beginning to happen in some states: research on data from Florida, for instance, is focused on the relationship between charter and traditional public schools and college going behavior (Booker, Gill, Zimmer, and Sass, 2008).

The same is true for teachers. To the extent that data about teacher effectiveness can be linked to information about their training, we can learn – in a quantitative sense – about the value of different approaches to teacher training.[13]

Unfortunately, research on educational policy interventions is often hamstrung by the fact that the various datasets collected either cannot (easily) be linked to one another or are not linked for political reasons. Sadly, in many places we probably could learn a great deal more based on the information we already collect.

All too often information is collected simply for compliance or pay purposes. This represents a tremendous lost opportunity to use the vast amounts of data that states already collect about students and their teachers. These data could be used to empirically answer questions about the value of investments in youth with a reasonable degree of certainty.[14] This in turn would help ensure that investments and public policies are based on the best possible information, and that taxpayer dollars are being used efficiently. Moreover, minor changes (such as the ability to link teachers and students) in data structure or policy would allow for great gains, not only in terms of assessing policies, programs, and practices on a large scale, but also in terms of feeding information back to individual schools and teachers so they can make more micro-level decisions that target the learning needs of individual students. Until we reach the point where states' data systems are functioning in this fashion, it is likely that many school administrators and teachers will view the data collection activities associated with No Child Left Behind as more of a burden than a benefit.

[13] This type of research has recently begun using state databases from Florida and New York (Boyd et al., 2008; Harris and Sass, 2007).

[14] For examples of how state longitudinal data systems are being used to answer questions about the value of policies or investments in K-12 education, see http://www.caldercenter.org.

Ultimately the promise of well thought-out and rigorous research that can help policymakers develop serious answers to the aspirations and challenges surrounding the nation's youth depends on assembling the scattered bits and pieces of information already collected into a single youth-focused data repository. Such a repository would allow states to better harness the power of empirical analyses. The bottom line is that up-front investments in data systems impose obvious short-run costs but offer the longer-term opportunity, if the data are used properly, to conduct rigorous research that could greatly inform policy decisions, and thereby improve youth outcomes.

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# Cost Analysis

# Teacher Identifier Systems: A Comparison of State Implementation and Costs

*By Kathryn Rooney and Robert Palaich, Augenblick, Palaich, and Associates (APA)*

## Introduction

In April 2007, Colorado Senate Bill 07-140 established the Colorado Quality Teachers Commission (QTC) to make recommendations on the implementation of a pilot teacher/principal identifier protocol (Quality Teachers Commision, 2008). During its 1st year, the QTC's purpose was to study the feasibility of establishing an identifier protocol for teachers and principals and integrating the identifier with the state's existing educational systems and databases (Colorado Senate, 2007). Specifically, the QTC's task is to create a policy that considers system capacity, personnel, and fiscal and resource conditions (Colorado Senate, 2007).

Augenblick, Palaich, and Associates (APA) were asked to help research the costs and implementation issues associated with implementing a teacher identifier system in Colorado. APA investigated these issues by interviewing staff at the Colorado Department of Education (CDE) and data managers in five states. This report presents the results of this research. First, we describe teacher identifier systems in general and then the methodology employed to research them. Next, we describe the characteristics and general implementation timelines of teacher identifier systems in the five states participating in the study. The report goes on to describe the existing capacity to implement a teacher identifier system in Colorado. Finally, we conclude by making recommendations about how Colorado should proceed with implementation.

## What is a Teacher Identifier System?

A teacher identifier system is a structure for assigning and maintaining a unique permanent ID for each teacher. Unique identifiers are attached to each teacher's records and used throughout the state data system (The Alliance for Quality Teaching, 2007). The complexity of teacher identifier systems varies significantly from state to state. Some teacher identifier systems link multiple aspects of teacher data together, while others also link teacher and student records through a common course identifier. Not surprisingly, the time and expenditures associated with implementing a teacher identifier system grow with the increasing complexity of the system.

## Study Methodology

APA began this study by meeting with the staff at the CDE who produced the original teacher identifier system cost estimate and implementation timeline. Discussions with the CDE provided information on the scope of the proposed system, the projected costs and a tentative timeline for implementation. In addition to these conversations, CDE gave APA copies of documents that

explained the projections in more detail. CDE staff agreed with APA that it would be helpful to learn from the experiences of other states that have developed (or are in the process of developing) teacher/staff identifier systems.

In early 2008, the Colorado Department of Education contracted with the Southwest Comprehensive Center at WestEd, which then subcontracted with RMC Research Corporation to collect descriptive and contextual information on state teacher identifier systems (RMC Research Corporation, 2008). The RMC report describes the results of interviews with data managers in seven states (including four of the states that participated in this study). APA reviewed the RMC report before designing the interview protocols used in this study.

APA's interview protocols were designed to investigate the steps and costs required to design, develop, roll-out, and maintain a teacher identifier system. APA contacted data managers in ten states to request interviews. Data managers in five states agreed to participate: California, Delaware, Kentucky, Louisiana, and Wyoming. All of these states are developing or already have in place data systems that use unique teacher identifiers.

Table 1 displays the numbers of students, teachers, and districts in each participating state. Note that Delaware, Wyoming, and California have very different numbers of students, teachers, and districts than Colorado. Thus, resource and timeline estimates provided by these states need to be adjusted to the Colorado context. Kentucky and Louisiana both have similar numbers of students and teachers as Colorado, although Louisiana has fewer school districts.

**Table 1: Students, Teachers and Districts per State**

| State | Students | Teachers | Local Education Agencies |
|---|---|---|---|
| **California** | 6,468,000 | 309,128 | 1,128 |
| **Delaware** | 124,000 | 7,998 | 35 |
| **Kentucky** | 688,000 | 42,413 | 196 |
| **Louisiana** | 723,000 | 44,660 | 88 |
| **Wyoming** | 84,000 | 6,706 | 62 |
| **Colorado** | 792,000 | 45,841 | 201 |

[1]Numbers are 2007 projections from the 2007 Digest of Education Statistics, Table 33.
[2]Numbers are 2005 numbers from the 2007 Digest of Education Statistics, Table 62.
[3]Numbers are 2005-06 numbers from the 2007 Digest of Education Statistics, Table 85.

## The Structure of State Teacher Data Systems

This section summarizes some of the differences and similarities in the structure of state teacher identifier systems. We pay particular attention to comparisons and contrasts in how states enter data, how they assign unique identifiers, how they verify data, and how they report data. Policymakers in Colorado will need to make decisions about these structural elements as they design the state's teacher identifier system. For more detailed information on each (interviewed) state teacher identifier system, please see Appendices A, B, C, and D.

### *Entering Data : The State's Role*

States differ in whom they allow to enter licensure-related data into the teacher data system. In some states, the state agency or organization assigns teacher identifiers and manages the data, but does not actually enter data (beyond the creation of the initial record).

Table 2 summarizes the levels of the system allowed to enter data into the system in each state.

**Table 2: Ability to Enter Data by State**

| | Level Allowed to Enter Data | | |
|---|---|---|---|
| **State** | **State Agency/ Organization** | **Local Education Agencies** | **Individual Teachers** |
| **California** | X | X | |
| **Delaware** | | X | X |
| **Kentucky** | X | X | X |
| **Louisiana** | | X | |
| **Wyoming** | | X | |

### *Assigning the unique identifier - the district's role*

The states also vary in how they assign the unique teacher identifier and what type of identifier they use. Table 3 presents the differences among the five states interviewed.

**Table 3: Assignment of Unique Identifiers by State**

| State | When 1st Assigned | Who Assigns It | Type of ID |
|---|---|---|---|
| **California** | After approval of licensing application | State Commission on Teacher Credentialing | Unique ID |
| **Delaware** | After approval of licensing application | State Department of Education | Unique ID |
| **Kentucky** | After approval of licensing application | State Professional Standards Board | Unique ID |
| **Louisiana** | Upon receiving first data submission from districts | State Department of Education | SSN |
| **Wyoming** | Upon request from districts | State Department of Education | Unique ID |

In each of these five states, either the state department of education or licensing/credentialing agency is responsible for assigning teacher identifiers. Louisiana is the only state in this group to use teachers' Social Security numbers as the identifier. Louisiana teachers are first entered into the system when the district submits data associated with their Social Security number.

### *Ensuring accuracy*

The five states use a variety of methods to ensure that data are correct. Although the state departments of education and the licensing/credentialing agencies have some role in verifying that data are accurate, all of these states require the districts to review and correct data errors. In some states, error checking is built into the teacher identifier data system, while in others, manual data reviews are a large part of the process. All states noted that manually checking data is very time consuming.

### *Data reporting*

The type of data reporting and analysis that takes place in each state is closely associated with the purpose of each system. Several states provide some access for teachers to review data associated with their record. All of the states in this study also provide districts with reports based on their own data, or give access to integrated data files that allow districts to run their own reports and analysis.

### Implications

The descriptions of variation in structure of teacher identifier systems according to who can enter data, how the identifier is assigned, how data are verified, and what type of reports and analysis are produced, provide necessary context for understanding the implementation of these systems. Each of these structural characteristics has implications for the design, development, roll-out, and maintenance of teacher identifier systems.

## Implementation

The timeframe for and cost of implementing a teacher identifier system were affected by two critical elements in each state: the purpose of the teacher identifier system and the sophistication of the computing platform on which the system was to be built.

### Purpose

More sophisticated purposes naturally result in more complex teacher identifier systems and require more time and resources to implement. When the purpose is clear, it is much easier to determine what data need to be included, how these data should be integrated, and how the system should interact with users. Table 4 shows the original purposes of implementing a teacher identifier system for each state. The purposes are presented in order of perceived importance to the state.

**Table 4: Original Purpose of Teacher Identifier Systems by State**

| State | Original Purpose |
|---|---|
| **California** | Analysis for decision-making, monitoring, and compliance, but not teacher evaluation |
| **Delaware** | Teacher performance evaluation and classroom data analysis |
| **Kentucky** | Replacement of SSN, upgraded data systems, and data analysis |
| **Louisiana** | Analysis, data accuracy, compliance |
| **Wyoming** | Efficient reporting, data accuracy, and data analysis |

The design and functionality of each system is driven by the goals for the system. For example, in Wyoming, the primary goals in developing a teacher identifier system were to reduce the burden on districts and improve data accuracy. Wyoming's automated system allows users to enter staffing data once (instead of multiple times) and its automatic error reports reflects this emphasis. Delaware developed a teacher identifier system as a means to facilitate educator performance evaluation. Delaware's system is the only one among these five states to provide teachers the ability to see real-time student performance associated with their courses. Teachers are encouraged to use the performance data to inform their instruction.

With the exception of California (at the end of the design phase), each of these states plans to integrate more data and improve the system's user interface(s). Kentucky, the only one of these systems that does not currently link student and teacher records, aspires to integrate these sets of records and expand the system to include postsecondary student records and electronic transcripts. Please see Appendix E for more information on the purposes of the teacher identifier systems in each state.

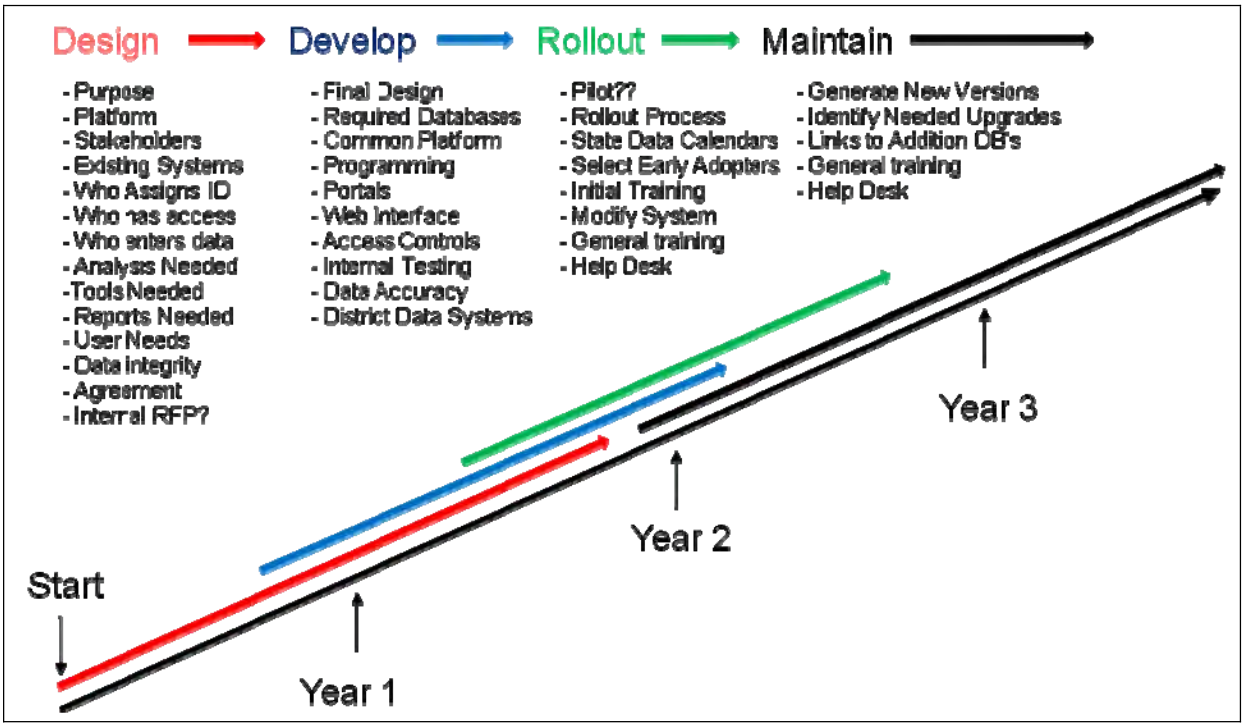
### *Computing platforms*

The influence of the computing platform also affects timelines and costs. If the state has most of its current databases housed on a modern platform (such as Oracle or Microsoft SQL Server), building the database and linking the teacher identifier system to other data structures is relatively easy. However, if the state has to draw data elements from legacy databases on older mainframe platforms or must link the teacher identifier system to such systems, the programming task is more difficult and the flexibility of the system is significantly reduced. Four of the states had upgraded their database platforms independent of building the teacher identifier system and that significantly reduced (or in California's case will reduce) the cost of adding this new data system.

The experiences of the five participating states allowed us to create a timeline for implementing a teacher identifier system in Colorado. Figure 1 presents the steps required to implement a teacher identifier system, considerations at each step, and a rough timeline. Each of these steps

is discussed in more detail below. For more information on the experiences of individual states in each of these phases, please see Appendices F, G, H, and I.

**Figure 1: Teacher ID System Creation**




***Design***

The design stage of implementation is characterized as the planning and pre-development stage of implementation. Colorado is early in the design stage of implementation. The data managers we spoke with identified preliminary discussions with key stakeholders as the critical step in successful implementation. Another important step is the transition of state data systems from a mainframe platform to a modern database platform that easily delivers information to the web. The design phase lasted between three months and two years in the states that were able to provide time estimates.

With the exception of Kentucky, each of the five states spent substantial time discussing and/or studying the purpose of a teacher identifier system, required data, and necessary functionality. The results of our interviews suggest that the amount of time spent in the design phase is proportional to the number of stakeholders that must reach agreement before development can begin. California has spent a significant amount of time in the design process due at least in part to the number of involved stakeholders and agencies (i.e., the professional standards commission, the county boards of education as well as all the typical stakeholders).

Delaware was the only state to have a fully-developed longitudinal data system capable of tracking students with a unique identifier, prior to development of the teacher identifier system.

This may have provided Delaware with additional expertise that reduced the duration of the design phase. Louisiana was the only state to not complete a migration to a modern database platform before beginning the development process. This lengthened the development process considerably. Table 5 presents a summary of the design phase in four out of the five states.

**Table 5: Design Phase Summary***

| State | Design Phase Duration | Development of Student Identifier System | Server Migration from Mainframe |
|---|---|---|---|
| **California** | 1 ½ to 2 years | In process | Complete |
| **Delaware** | 2-3 months | Already developed | Complete |
| **Louisiana** | 1 year | In process simultaneously | In process simultaneously |
| **Wyoming** | Timeline is unclear | In process simultaneously | Complete |

** This table excludes Kentucky which did not complete a true design phase.*

In the design phase of a teacher identifier system, it will be important for Colorado to bring stakeholders and developers together from across the state to discuss a range of issues, including the short- and long-term purposes, allowable uses, included data, user access, sequence for data submission, and the necessary functions of the system. Several states believed that the planning stages of implementation were the most important and advised Colorado to allow ample time to reach agreement. Information technology staff at the Colorado Department of Education also believed that if the state carefully considers the purpose and plan up front, the actual development will be more straightforward. Of course, Colorado may have to modify, refine, or expand on the initial design, but a clear purpose and detailed specifications up front provide a consistent direction for developers to follow. California, for example, spent $400,000 and a full year simply to create the RFP for their teacher identifier system.

One important topic of discussion at the design meetings should be who will have the ability to enter data. This question is closely tied to the purpose and the type of data that needs to be collected. Delaware had a philosophy that data was most likely to be accurate when the user closest to the data was the person responsible for entering it. Three of the states currently rely on districts to enter data that includes both student and teacher course assignment information. Since Colorado does not currently require districts to submit student or teacher course assignment information to the state, implementing a system that collected this type of information would create an additional effort on the part of Colorado districts. It would also likely necessitate additional technical support and assistance to districts until they adjusted to the new reporting structure.

During design discussions, decisions should also be made about when to assign the identifier. Most of the states assign identifiers to new educators when they are awarded their license or certification. Unique identifiers can be created for existing teachers, although there should be a plan in place for integrating existing records accurately across state and local data systems. Colorado's model for assigning student identifiers has been relatively successful and a similar model could be followed for teachers.

The states that operated a web-based user interface appeared to spend less time entering or checking data manually. A system for ensuring data accuracy should be built into the Colorado teacher identifier system from the beginning. Several states have in place an automated system that checks for duplicates and other common errors before transferring data between systems. Data can then be excluded from the transfer until it is correct. Although it may still be necessary to manually validate some data, automated error checking should reduce the time spent on manual verification. Colorado already has an automated system in place for error checking student identifiers. It should be relatively simple to develop a similar error checking process for a teacher system.

Colorado stakeholders should discuss what type of data and reports will be provided to different user categories. Most of the states provide different levels of data access to different user categories in order to protect privacy. It also might provide incentives for users to submit timely and accurate data if the Colorado system provided some reports for different categories of users. These reports might include reports that users often have to run themselves, thereby saving the users time and effort.

### *Development*

The development phase of teacher identifier systems includes both system development and integration. Because the purpose of the systems (and the state of existing systems) varied among these states, the development stage took a different course in each state.

The length of time spent executing the development phase of the project was directly related to whether the bulk of the state's education data infrastructure was up and running on a modern database platform. For states that operated on such a platform, their development phase for the teacher identifier system ranged from just over two months to nine months. In contrast, the state that was not operating on a modern platform, Louisiana, took 18 months to create their teacher identifier system. The states that were operating the bulk of their data systems on a modern technology platform started that migration in the late 1990s or early 2000s. Sometimes these initiatives were led by the governors' offices and sometimes the state received technology upgrade grants from the federal government. Although these technology infrastructure transitions were expensive when they occurred, the new platforms significantly reduced the time and resources needed to develop the teacher identifier system. It also allowed the teacher identifier system to be modified and expanded once it was operational.

States varied as to whether the programmers were state employees, contractors or some combination of the two. It was clear that the number of programmers assigned to developing the teacher identifier system directly influenced the amount of time spent in the development phase. In virtually every case, a full-time project manager from the agency also worked on the project through this phase. Whether staff resources from the operational side of the agency (i.e., from the licensure office or the credentialing commission) were assigned to the development phase also differed by state.

Colorado should consider moving state educational databases to modern technology platforms before beginning to integrate data. This is likely to reduce implementation time and resources, as well as complexity. The state also needs to consider how the development will be staffed. Staff

may include contractors, although the contractors should be working closely with a project manager who is employed by the state.

***Roll-out***

Thoughtful rolling out of an integrated teacher data system is an important step to ensure the success of the system. Roll-out includes the process to inform users about the system, to make needed adjustments to initial interface designs, to actually debut or release the system, and to conduct any pilot processes. In this context, a pilot is defined as a test or trial process used to determine whether or not a teacher identifier system could be successfully implemented.

None of the five states conducted a formal pilot before developing their system. The key reason was that piloting requires virtually the same amount of development work in order to realistically simulate data collection and submission by the districts. In other words, it is difficult to pilot a system that is not yet built. Four of the states rolled out their system (or plan to roll it out) over periods ranging from a month to a year. Three of these states released their system to several districts early to ensure they received feedback in time to modify the system before statewide implementation. Two states, Louisiana and Wyoming, rolled out their systems with a time cushion that would allow the districts to get accustomed to using the system and provide ample time for support if necessary.

Table 6 presents a summary of the type and duration of the roll-out processes in each state.

**Table 6: Roll-out Phase Summary**

| State | Type of roll-out | Duration |
|---|---|---|
| **California** | Feedback from several early counties and LEAs | 1 year |
| **Delaware** | Informal feedback from several early districts | 3-6 months |
| **Kentucky** | None | Not Applicable |
| **Louisiana** | Informal feedback from several early districts | 3-4 months |
| **Wyoming** | Early roll-out with training | 1 month |

The states provided different amounts of training and support for users. Wyoming, for example, conducted numerous trainings around the state with districts data managers, and offered other support modules for those who could not attend. The state found downloadable multi-media trainings or brochures to be helpful in place of trainings. Kentucky did not offer much training because the system was relatively simple for users to navigate. Delaware focused more heavily on technical assistance because their users included teachers, making it much more difficult to conduct in-person trainings.

Colorado stakeholders should discuss the schedule for releasing the teacher identifier system. APA recommends that the state provide ample time for districts to adjust to any new reporting requirements before data submission deadlines. User trainings may be necessary for any system changes. Depending on the changes, it may be possible to provide multi-media training modules instead of, or in addition to in-person trainings. Finally, Colorado needs to plan for technical support that may be needed as users adapt to a new system.

### *Ongoing maintenance*

After development and roll-out, it becomes necessary to maintain integrated data systems. While the costs associated with maintenance may not be as extensive as the creation of the system, they may still be considerable. There are three aspects to the maintenance phase of the teacher identifier system.

The first focuses on collecting suggestions for changing interfaces and adding functionality. When enough of these requests are collected, a new version of the identifier system is proposed, designed, funded, and developed. This typically happens once every couple of years. Staff from Delaware warned, however, that if the teacher identifier system works well, the number of additional potential applications is quite large. The second aspect of maintenance is the annual effort required to keep the identifier system up, running and accurate. Even in relatively small states, part-time staff was necessary to ensure the integrity of the teacher identifier database and the uploading of data from school districts. Four out of the five states employ (or plan to employ) vendors to help with system maintenance. These states also employ staff with technical expertise to work closely with the vendors. California and Delaware were the only states to explicitly mention server costs, although presumably every state incurs annual costs for purchasing or upgrading servers and maintaining the required software licenses.

The final aspect of maintenance is ongoing user support. In Delaware and Kentucky, data managers were surprised by the cost to support users with tasks such as logging in. Both of these states reported that significant staffing time was spent supporting users who struggled with the technology. There is some evidence however, that initial user support costs may decrease over time as early problems with user interfaces are resolved and users adjust to the new system.

The experiences of these five states indicate that it may be necessary for Colorado to purchase or upgrade servers regularly and purchase and maintain software licenses. The state should also consider whether the CDE should maintain the system or whether hiring a vendor to help with part or all of system maintenance is needed. Resources should be factored in to cover either option. In addition, Colorado should anticipate providing technical support and assistance for users when new user interfaces are released.

## Colorado Capacity and Projections

The Colorado Department of Education developed and currently administers the Record Integration Tracking System (RITS), an application that creates and manages unique State Assigned Student Identifiers (SASIDs). At this time, the student identifier system does not provide the state with up-to-date enrollments or student course assignments for each student. Districts can upload student records with SASIDs using an automated data exchange function into the state system. The state system automatically checks the data for errors and submits problematic record issues to RITS case management staff, who then work with the districts to resolve problems. The state also reviews selected records by hand as another means of error checking. Information technology staff at CDE report that the technical, accuracy, and customer service elements of RITS have worked effectively.

Teachers currently submit their hard copy application for licensure to the CDE Licensure Division for review of qualifications, processing, and issuance of license. When a licensure

application is approved and a license is issued, the teacher can then be hired by a Colorado school district. Districts can use an online portal to validate particular background characteristics before they hire a teacher.

CDE staff is confident that a teacher identifier system with functionality similar to RITS would also be successful. The entire infrastructure necessary to create such a system is already in place. One potential challenge in developing a teacher identifier system is the current level of CDE staffing. Although existing staff has the expertise to create the teacher identifier system, there is a consensus at CDE that it would be more practical and timely to hire an outside vendor to develop a teacher identifier system due to limited staff time.

***Costs***

The projected cost to develop a teacher identifier system in Colorado ranges from about $686,000 to at least $2.7 million, depending on which components are included. This includes $636,000 for system modifications and $50,000 for necessary additional hardware (the hardware estimate assumes 2009 costs). CDE's original cost estimate is modeled on the cost of implementing RITS, but does not include the integration of principal identifiers, as described in the legislation that created the QTC. CDE staff predicts that incorporating principal identifiers would be relatively simple and inexpensive because the state licensure system already identifies principal licenses.

The estimate for the teacher system assumes that fewer development hours would be required for the teacher identifier system because the entire essential technology infrastructure already exists to support RITS. There will, however, be a need for updates to the data warehouse, as well as rollout, training, and case management for the teacher system. Hourly staff rates will also be higher for the teacher system compared to the development of RITS in 2002. In addition to necessary development costs, the state estimates that ongoing maintenance will cost approximately $100,000 per year.

In addition to the costs identified as necessary for implementation of a teacher identifier system, the CDE also recommends that existing data systems be updated and enhanced in order to improve the utility of the teacher identifier system. Table 7 presents the CDE's projected costs to implement a teacher identifier system:

**Table7: Costs of Implementing a Teacher Identifier System***

| Cost Component | Projected Costs | Necessary | Recommended |
|---|---|---|---|
| **System modifications** | $636,000 | X | |
| **Hardware** | $50,000 | X | |
| **Costs of adding principal records** | Minimal | X | |
| **Ongoing costs: Training, technology maintenance, & case management** | $100,000 | X | |
| **Updates to teacher licensing system** | $2,000,000 | | X |
| **Updates to other linked data systems** | Not specified | | X |

*Costs are based on documentation provided by the Colorado Department of Education

### *Piloting*

On January 28, 2009, the Colorado House of Representatives passed House Bill 09-1065 to create an educator identifier pilot program[15]. The implementation of this pilot is conditional upon the receipt of sufficient funding. If this funding is available, the state plans to complete a pilot during the 2009-2010 fiscal year, in time for the General Assembly to consider full implementation by December 2010. The pilot described in HB 09-1065 is for full-implementation led by the state and piloted in five districts that would be compensated for their time. This option would use an altered version of RITS and would be used to assign educator identifiers. It would require Colorado to make a full system investment up-front. If successful, this system could be scaled up quickly statewide. Table 7 presents the costs associated with implementing this pilot:

**Table 7: Costs of Educator Identifier Pilot***

| Cost Component | What The Cost Includes | 2009-10 Expenditures | 2010-11 Expenditures |
|---|---|---|---|
| **Personal services** | 1 senior consultant; 2 administrative assistants | $143,688 | $143,688 |
| **Contract services** | Contractor to plan and conduct data analysis | $120,000 | $60,000 |
| **Operating expenses & capital outlay** | Routine and one-time operating costs | $18,534 | $2,850 |
| **System modifications and hardware** | One-time upgrade costs | $686,000 | $0 |
| **District incentives** | Incentives for 5 districts to participate at $25,000 per district | $125,000 | $125,000 |
| **TOTAL** | | **$1,093,222** | **$331,538** |

*Source: Colorado House Bill 09-1065

According to House Bill 09-1065, the purpose of the pilot would be determine whether a statewide teacher identifier is recommended and if so, how to implement it. However, it is implausible that the state would expend this amount of money to develop all the necessary components of a teacher identifier system, and then decide not to implement the system at all. Thus, we conclude that the actual purpose of the pilot is to inform statewide implementation, not to determine whether the system should be implemented.

## Recommendations for Colorado

According to Senate Bill 07-140, the bill that established the Quality Teachers Commission in Colorado, a coordinated and comprehensive statewide data system would allow the state to track demographic and licensure information and to monitor important features of the teacher and principal workforce (Colorado Senate, 2007). The Colorado General Assembly finds it to be in the best interest of the state to develop and integrate a teacher identifier system with other educational databases, including the longitudinal student growth model currently under development (Colorado Senate, 2007). Thus, the legislative purpose of the Colorado teacher

[15] This requirement for a pilot was later dropped in the final legislation.

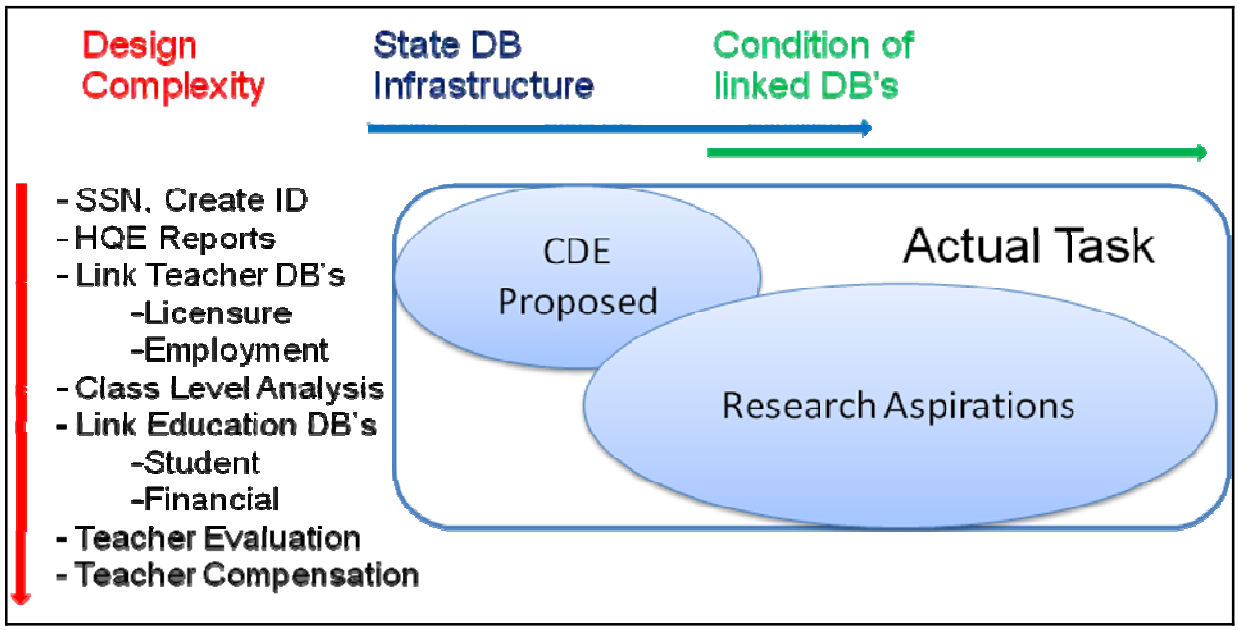
identifier system is to link teacher and student records in order to conduct more thorough analysis of teacher quality and distribution.

***Determine the goals***

The projected cost of $686,000 for system modifications and upgrades includes the assignment of teacher identifiers and the integration of these identifiers into existing data systems. These steps will allow the state to link teacher data systems such as human resources information and licensure information. However, this system will not allow the state to link teacher data to student data.

Figure 2 shows how the proposal that is associated with the cost estimate differs from the state's long-term research aspirations. To achieve the research aspirations would require additional infrastructure and database development beyond those currently proposed.

**Figure 2: Colorado Goals and Proposal**




APA recommends that the state engage in a design process to reach consensus on the short- and long-term goals of a Colorado teacher identifier system. Once the goals are clear, it will be possible to make other critical decisions about what data to include, the sequence of data submission and system development, and what system functions are necessary. These decisions will then enable the CDE to produce a more precise cost estimate and timeline.

***Consider the impact on districts***

If stakeholders hope to conduct more complex teacher quality analysis, it will be necessary to link teacher and student data systems. It will also be necessary to create a unique course assignment data system and a process to assign students and teachers to the courses. This is not a trivial undertaking for the state or for local school districts. In such a system, districts will then need to collect, format, and submit course assignment data for each of their students and teachers to the state. This will be a significant ongoing effort for districts, especially those districts that

do not currently collect or maintain this type of data. The state needs to build in the time and resources necessary to support districts in this process.

### *Transition data systems*

Although RITS resides on a modern Oracle platform, the state has not yet moved its entire legacy, file-based data collection systems to a modern database platform. All of the interviewed states appear to be moving toward a modern database platform. If possible, Colorado should transition the remaining educational data systems from HP 3000 platforms to modern database platforms before integrating teacher data across data systems. This is likely to reduce the time necessary to simplify the data integration process.

### *Consider an early roll-out instead of a pilot*

None of the states included in this study ran a pilot to determine whether a teacher identifier system should be implemented. Several of these states did however roll out their new system to a handful of districts before full implementation. The states used this early roll-out time to collect actual data from the districts as well as to collect feedback on how to improve their system. This provided the state with a cushion of time to resolve problems before scaling up and provided district users with a chance to obtain extra support and assistance.

In addition, four of the states gave all districts ample notice of system changes and a longer period of time to enter data during early roll-out. The results of these interviews suggest that extra time and an early roll-out to a limited number of districts may be helpful for successful implementation in Colorado. Based on this set of interviews, if Colorado is interested in using a teacher identifier system, there is no need for a pilot to determine whether or not a teacher identifier system should be implemented. Instead, we recommend that the state roll out its system early to several districts and use the input of these districts to improve the system before statewide roll-out.

### *Despite challenges, the results justify the means*

Although each state experienced challenges in the implementation process, they were all pleased with the end product. All of the states (with the exception of California, which is still in the design phase) believe that their system has improved the efficiency of data reporting, data accuracy, and their capacity to conduct meaningful analyses. The results of implementing a teacher identifier system appear to justify the time and resources required to implement and maintain the system.

## Appendix A: Who Enters Data

### *California*

California teachers each submit their credential application to the California Commission on Teacher Credentialing. Once the application is approved, each teacher's data is entered into the system by the Commission. Every year in the fall, districts are required to enter teacher course assignment information into the system. When the new teacher identifier system is in place, the course assignment information will be associated with the unique teacher identifier. Although California is still in the design phase of a teacher identifier system, the process of districts data submission is unlikely to change.

### *Delaware*

The Delaware Department of Education has a philosophy that data should be entered at the lowest level of the system possible. As a result, teachers submit their application for licensure online and send hard-copy documentation to the Department of Education for verification. Once each teacher's licensure application is approved, he is assigned a teacher identifier that can be used to log in and update qualifications and contact information. Schools and districts also enter data such as teacher course assignments. With the exception of verifying qualifications when teachers apply for licenses, the state does not enter data.

### *Kentucky*

In Kentucky, teachers can update their name and contact information using the unique identifier. Initial applications for teacher licenses are sent to the Kentucky Education Professional Standards Board, where teacher information is entered into the system. Districts are responsible for submitting course assignment data that is linked to the teacher data.

### *Louisiana*

Louisiana does not allow teachers to enter or modify their records. Districts enter all of the teacher data and the state manages the data.

### *Wyoming*

Unless they are assigned district administrative or data responsibilities, Wyoming teachers do not enter, modify, or have access to their own data. Districts are responsible for entering teacher data into a CSV file and uploading it into the state data system.

## Appendix B: Assigning Unique Identifiers

### *California*

The California Commission on Teacher Credentialing assigns a unique statewide identifier to each teacher after approving his credential application. Records for teachers who were previously issued lifetime credentials were stored on microfiche, and the state is now requiring all of these records to be processed by the Commission in order to assign identifiers to these individuals. The Commission will distribute the unique identifiers to the County Offices of Education, which in turn will work with the local educational agencies to integrate the identifiers into their local data information systems (California Department of Education, 2009).

### *Wyoming and Kentucky*

In Wyoming and Kentucky, teachers may have other unique identifiers assigned to them. Some Wyoming districts assign a local district identifier to each teacher, although districts are increasingly using the state-assigned identifier instead of tracking two different numbers. Wyoming school districts

request identifiers from the state for each new teacher. This process recently was streamlined to allow districts to submit all individuals on district payroll through an automated system, which generates unique identifiers that are sent to districts.

The Kentucky Professional Standards Board and the Kentucky Department of Education each assign a unique state identifier to teachers. However, the Board-assigned identifier is the one used to integrate data across data systems.

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## Appendix C: Ensuring Data Accuracy

### *California*

The existing California teacher identifier system relies on County Offices of Education to review teacher assignment data to ensure that assignment and credentials are correctly aligned. When the new data system is in place, this responsibility will shift to the California Department of Education, which will validate the data and then send reports to the county offices of education to resolve problems with the local educational agencies.

### *Delaware*

In Delaware, data are entered at the lowest user-level possible and then reviewed by the levels above. For example, schools review data entered by teachers; districts review school data; and the state reviews district and licensure data. The automated system provides customized levels of access for each user type to facilitate this review process. The state is responsible for verifying the documentation of teacher qualifications during the teacher licensing application process.

### *Kentucky*

The Department of Education in Kentucky requires districts to submit data from the Financial Management System (MUNIS) and Local Educator Assignment Data (LEAD). These data are then audited at the state level. Districts are responsible for auditing their own LEAD data before submission and for reviewing the Highly Qualified Teacher Reports produced by the Professional Standards Board for their district.

### *Louisiana*

Louisiana's state system runs automatic error checking as district users upload data. Problematic or duplicate records do not get entered into the state system. The system produces error reports for the districts, which they must resolve and re-submit.

### *Wyoming*

Wyoming assigns primary responsibility for data verification to the districts because the purpose of the system is to provide data for district use. Thus, the districts have an incentive to ensure the data are accurate. Wyoming districts recently requested different user roles in the system: 1) a role that can create, look up, and delete teacher data; 2) a role that can create and look up teacher data, but not delete information and; 3) a role that can only look up teacher data. The state believes this is a good suggestion and may implement this in the future. The state re-runs data submitted by districts to ensure that identifiers are not duplicated. The system also cross-checks new data with past collections.

## Appendix D: Data Reporting

### *California*

The stated purpose of California's teacher identifier system is to enable advanced analysis of teacher quality data (California Department of Education, 2009). This analysis will inform state and local decision-making, as well as assist in monitoring and compliance (California Department of Education, 2009). However, the details of the California reporting and analysis processes are not available since development has yet to commence.

### *Delaware*

The Delaware Department of Education runs several standard reports for each district using data integrated across data systems. In addition, the state provides a few analysis tools that districts can use to run their own reports. Users have different levels of access depending on their status as a user in the system. Teachers can sign into the user portal and access approved information, which includes student assessment data for the course(s) they teach.

### *Kentucky*

The state runs several reports for each district and allows each district to download certification data for their district. Districts can then integrate the downloaded data with their other teacher data records to run their own analyses.

### *Louisiana*

The state of Louisiana uses teacher data collected through the integration of data systems to analyze teacher distribution and quality across the state. Each district has access to their aggregated district data to use for their own purposes. Louisiana allows districts to provide teacher access to the district data, but does not require them to do so.

### *Wyoming*

The Wyoming Integrated Statewide Education (WISE) data system is designed to assist districts with reporting requirements and data analysis. WISE integrates district data from different systems at the state level and then redistributes the integrated data for the districts to use in their own analyses. Districts currently have formed a consortium to determine what other type of data and reports would be helpful and the state is committed to working with the consortium to provide these data and reports.

## Appendix E: Purposes of Teacher Identifier Systems

### *California*

The purpose of both the student and teacher identifier systems in California is to enable more complex analysis that will support state and local decision-making, monitoring, and compliance (California Department of Education, 2009). Existing legislation prohibits the use of the data for evaluating teacher performance.

### *Delaware*

Delaware's teacher identifier system resulted from legislation that required teacher performance evaluation. It quickly became clear after the legislation passed that the state needed some way to link teacher records to student achievement data in order to accurately assess the teachers. This brought about the development of the Delaware Performance Appraisal System (DPAS) and the integration of this

system with the state payroll, state licensure/certification, and student accountability data systems already in existence.

### *Kentucky*

The original purpose of the teacher identifier system in Kentucky was to replace Social Security numbers with unique identifiers, particularly on documents (such as teaching licenses) distributed by the Education Professional Standards Board. The governor of Kentucky allocated $1.5 million for the state to upgrade educational data systems. The state used this money to move systems from a mainframe platform to an Oracle system in 2001, to create certification data and intern management systems, and to link the certification system to the financial management system.

### *Louisiana*

The initial effort to construct a longitudinal educational personnel database in Louisiana was brought about by 1992 legislation. In 2003, the state began to integrate the teacher data system and the student information system into one system called Louisiana Educational Accountability Data System (LEADS). This integration was intended to enable high-level analyses, improve the accuracy of the data, and comply with federal and state requests.

### *Wyoming*

State legislation in 2004 established the need for an integrated data system in Wyoming. The purpose of Wyoming's WISE system was to establish a statewide data system that would eliminate duplicative data systems and improve the ability of districts to meet reporting requirements without undue district burden (Wyoming Department of Education, 2009). Although the initial phases of the statewide data system integrated only student data, the system expanded in 2006 to include teacher data as well.

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## Appendix F: Design of Teacher Identifier Systems

### *California*

California is still in the design stage of implementation. The state department of education completed a 2006 feasibility study on implementing a teacher identifier system. Legislation was passed soon after authorizing the Commission on Teacher Credentialing to assign statewide educator identifiers (California Department of Education, 2009). The legislation requires a working group of educational stakeholders to be convened to oversee the design and development of the teacher identifier system. Implementation of a student identifier system is currently underway and that system will be rolled out in the fall.

California commissioned a vendor to write a detailed RFP for developing a teacher identifier system. The creation of the RFP took an entire year and cost $400,000, partly due to the involvement of California contract control agencies. Proposals from vendors are under review. The selected vendor must comply with state department of education standards and create the teacher data system and integrate it with the student system on SQL servers stored at the department.

### *Delaware*

Delaware spent two months discussing its teacher identifier system before any development took place. These discussions brought together stakeholders from the following constituents: the state department of education, district administrators, teachers, and business leaders. The stakeholders collaboratively determined the purpose of the teacher data system necessary data to include in the system, and the type of access that different users would have in the system. A major source of controversy during these discussions was the decision about when to integrate particular data and what the lockdown times should

be for data submission. Developers cite these types of decisions as critical for a smooth development process.

The Delaware developers believe that the development process was much easier as a result of their move from a mainframe database platform to MS SQL servers in 1997. With all of their data systems on the same platform, the development and integration went relatively smoothly.

***Kentucky***

In 2001, the state invested $1.5 million to upgrade teacher and student data systems. The state used this money to transition both student and teacher databases from a mainframe platform to an Oracle platform. This process took 3-4 years and included both the creation of infrastructure and the purchasing of licenses. The developers believe that the transition to Oracle facilitated the integration of data across systems. Although the Kentucky teacher identifier system links teacher assignments with financial information through the common identifier, it does not link these teacher records to student records. Unlike the other states, Kentucky did not convene stakeholders or conduct a feasibility study.

***Louisiana***

Louisiana spent a year in the design phase holding discussions with key stakeholders before actually integrating data systems. These conversations typically included district representatives, state department of education analysts and policymakers, and programming staff. Stakeholders discussed the purpose of the integration, necessary data, the data collection sequence, and the functionality of the user interface. Louisiana has been moving its data systems from a mainframe platform to MS SQL servers since 2004. The last of the data systems will be transitioned onto SQL servers by June 2009.

***Wyoming***

An initial design team was formed that was comprised of two legislative members, two data experts, two district technology coordinators, and a district superintendent (Wigert & Bickell, 2006). The design team commissioned a vendor to study the structure necessary to implement an integrated data system. This study cost $214,216 in 2003-04 (Wigert & Bickell, 2006). The design team also selected a vendor to implement the system and collaborated with the vendor in the development process. The state department of education and the vendor held several meetings with local districts to discuss timelines and request feedback.

In Wyoming, the design and development of the teacher identifier system has overlapped considerably with the development of the student data system and has used the same funds. The process of implementing WISE has been facilitated in part by the use of an Oracle data warehouse and MS SQL server for both the student and teacher data systems.

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## Appendix G: Development of Teacher Identifier Systems

***California***

California is still reviewing proposals from vendors to develop its teacher identifier system, and thus has not yet begun development. Nonetheless, the state has made some decisions based on the feasibility study that will impact development. California will replace teachers' Social Security numbers with unique identifiers that scramble the Social Security numbers. Potential teachers who apply to the Commission for Teacher Credentialing will receive one of these numbers when their licensure application is approved. Existing teachers will have an identifier assigned to replace their Social Security numbers. One of the challenges is that the data for lifetime credential holders in California is currently stored on

microfiche. California is requiring this information to be entered in the new system but that process is just beginning and is cumbersome.

The student system that will roll-out in the fall of 2009 will require local education agencies to submit student course assignments to the state. The California Department of Education already collects teacher course assignment data and this will eventually enable the state to link teacher and student records.

When the system is developed, California will take snapshots from the integrated data system at particular times during the year. This will enable the school to track teacher mobility from year to year. Since the data will not be updated in real time, it will not be able to track teacher movement during a single school year. According to the interviewed data manager, tracking data in real time would be a huge reporting burden on local education agencies.

California estimates a total cost of developing and implementing the teacher identifier system at $11.8 million over the course of four years. This cost may change after California has reviewed vendor proposals.

### *Delaware*

The state of Delaware has four distinct state educational data systems. These include a performance appraisal system, a payroll system, a licensure/certification system, and a student accountability system. The state controller runs the payroll system while the department of education maintains the other three systems. The last of these systems to be developed was the performance appraisal system (DPAS), which took nine months to develop in 2002. The teacher identifier system was built during the same time period in order to link teacher records to student performance data.

When applications for teacher licenses are approved, unique identifiers are assigned to the approved applicants. The state mandates that all of the data systems integrate these unique identifiers. The student accountability system had to be modified in order to meet this mandate. Student and teacher data are linked via class code.

Teachers can update their records at any time using a single user interface into the state system. In contrast to the other states interviewed, Delaware's integrated system extracts data from district and state systems daily. This allows the state and other users to review and analyze data in real time and see changes almost as they occur.

To develop this system, the state had to purchase both a database server and a web server, along with the necessary software licenses.

### *Kentucky*

Kentucky's development process was somewhat simpler than the other states because it has not yet linked teacher records to student records. Kentucky's challenge was to integrate the financial management database (MUNIS) with the teacher course assignment database (LEAD) to establish a common teacher record linked through a unique teacher identifier.

The Kentucky Department of Education maintains the MUNIS and LEAD databases while the Kentucky Professional Standards Board maintains the teacher licensure/certification database. When teachers apply for certification, they submit their Social Security numbers to the Board and are assigned a unique identifier. Districts use this identifier when they upload financial data five or six times a year and upload teacher course assignment data twice a year. The Department and the Professional Standards Board then link their data records through the unique identifier. It is possible to update data in all the databases

through a single user update. Because the system only takes snapshots from the uploaded data, it does not offer updates in real time.

Kentucky has faced two major staffing challenges during the development process. First, budget cuts have reduced the Professional Standards Board project staff from thirteen to five. In addition, it was difficult to find .Net programmers and it became necessary to use contractors with .Net skills instead of internal staff. A noted disadvantage to this is that contractors tend to be more expensive and may have a more difficult time providing support to users or state agency staff.

### *Louisiana*

Louisiana first developed longitudinal student and teacher databases in the 1990s. In 2003, the state began thinking about how to integrate the databases and decided to link them through teacher and student Social Security numbers. Each student and teacher Social Security number is linked to their courses and it is possible to associate their records through the course code.

One of Louisiana's biggest challenges was the fact that the transition from a mainframe database platform to a modern database platform took place during the same time period as the integration of data systems. The development of the integrated system took 18 months, due in part to the time it took staff to become proficient in C-sharp programming. Another challenge for Louisiana was the turnover in database analysts during system development. This turnover increased the development time.

Louisiana's data system provides only snapshots of the data, instead of real-time data based on the most recent updates. Louisiana developed the integrated system using only state employees. The effort required three programmers for one year, as well as one programmer and one analyst for two years each. The interviewees report that they did not have any major technology costs because the data storage and application servers, as well as the necessary software licenses, were already available.

### *Wyoming*

WISE grew out of the need for an improved data collection process. WISE allows districts to be more efficient in data reporting and improves the state's capacity to analyze data. Prior to the development of WISE, the Wyoming Department of Education provided significant assistance to districts in both data collection and reporting.

Wyoming links teachers and students through the use of a shared course ID. Districts assign both students and teachers to a course and then send this information to the state. Using the common teacher identifier, the state can also integrate information from district surveys, certification records and highly qualified teacher records.

Wyoming's user interface was released in February 2009. The interface requires districts to submit data to be stored on Department servers instead of at the district level. The Department expects the interface to greatly improve the speed at which identifiers are assigned. One advantage of WISE is that it allows districts to enter data only once and the information is integrated across all state data systems. Districts can still use their own data management packages and the Department will develop downloads that will be compatible with the districts' systems. One of the initial challenges of implementing WISE was the amount of time required by districts to format and enter data for submission into the new system. As districts have adjusted to the new reporting structure, this time has substantially decreased.

It is difficult to distinguish costs and implementation time between the Wyoming student and teacher data systems as they have been functionally combined. The state rolled the costs into the statewide education data system originally designed for student data. Initial investments were $5 million to be spent over the

course of five years. The Oracle database platform and servers required to house the data were the major expenditure.

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## Appendix H: Roll-out of Teacher Identifier Systems

### *California*

Although California is still in the design phase, the state anticipates running a phased system roll-out with a few counties and local education agencies a full year before statewide implementation. During this year, developers will solicit feedback and modify the system as necessary.

### *Delaware*

Once an initial version of the teacher identifier system was developed, the state of Delaware allowed several districts to use the system and provide feedback during a period of three to six months. This feedback was used to make improvements to the system before it was rolled out to the remaining districts. The state department of education provides training primarily upon request from district personnel and others users. The state department of education also provides technical assistance to users who have difficulty logging in or who experience other problems. One of Delaware's ongoing challenges has been the large amount of time and resources necessary to help users feel comfortable interacting with the new system. This is discussed in more detail in Appendix I.

### *Kentucky*

Kentucky did not conduct a formal pilot or roll-out. The state simply distributed teacher identifiers, asked districts to replace the Social Security numbers on record with the unique identifiers and use the identifiers when they upload teacher data. Kentucky offered very little training to users largely because the new system is relatively simple for the user to interact with.

### *Louisiana*

Louisiana did not run a formal pilot, but instead rolled out its integrated data system over the course of eight months. In January 2005, Louisiana allowed a handful of school districts to begin entering data. These districts provided early feedback on the system that allowed the state to make modifications before statewide release in May 2005. All districts were required to use the integrated system to enter 2005 end-of-the-school-year data between May and August 2005.

The state provided districts with the data format that they must use to submit data. Additionally, the state trained districts how to enter data, recognize errors, and read reports. State department of education personnel informed districts one year in advance of the roll-out that they would need to ensure their software was compatible with the state system.

### *Wyoming*

Wyoming's user interface was recently rolled out to districts. The unique teacher identifiers were sent out prior to the release of the user interface. Although this worked effectively, the small number of teachers in the state may have made this process more feasible than it would have been in larger states. The state would recommend releasing the identifiers and user interface at the same time. Like the other states, Wyoming did not conduct a pilot of the teacher identifier system.

The state offers training to users through a variety of means. A recent central training included district data administrators from 43 out of 48 districts. Regional trainings are also offered by Department staff around the state. Web-conferences, video-conferences, and downloadable tapes of the trainings are available to help users understand how to use the new interface, submit data, correct data, and understand

reports. At the recent training, district personnel were excited about the new interface because they believe it will expedite the process of assigning identifiers and entering data. The state also rolled this interface out more than a month before the subsequent data collection effort, which provided time for users to experiment and seek assistance before submitting final data.

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## Appendix I: Maintenance of Teacher Identifier Systems

### *California*

The feasibility study conducted in California projects ongoing maintenance costs for the teacher identifier system ranging from approximately $1 million to $1.8 million per year. These costs reflect the amount necessary to house the system and secure contracted services for maintenance (California Department of Education, 2009).

### *Delaware*

The Delaware Department of Education reports that most ongoing technology costs include server upgrades and the purchase of software licenses. A number of employees work part time on the teacher identifier system at the Department. The Department employees oversee eight part-time contractors with experience in SQL, Java, and .Net who work on the system. Maintenance time is spent partly responding to new state requirements and requests for improvements.

Due to the number of different types of users who enter data into the system, Delaware system developers worked hard to make the system user friendly, and included features that allow users to look up their usernames and passwords if they forget them. Nonetheless, Delaware Department of Education staff estimate that approximately 30% of their team's staff time is spent assisting users. They also believe that after a year, only about 60% of system users feel comfortable using the system. Delaware is a small state and the interviewees believe the amount of time spent on support could be a major challenge for a larger state.

### *Kentucky*

Current system maintenance for the Kentucky teacher identifier system includes $30,000 per year to support an Oracle server, as well as staffing costs. Existing staff that work at least part time on the system include an IT Manager, one .Net programmer (a contractor), two database administrators, and a web programmer. Staff at the Kentucky Educational Standards Board have been surprised at how much time it has taken to support teachers who are trying to log in to view their credential, even with a feature that allows users to lookup their username and password.

### *Louisiana*

The Louisiana interviewees believed that most of their system maintenance costs are for staffing. Currently, Louisiana requires a half-time database analyst to run backups, coordinate uploads, and make additions; a full-time FTE data manager working mostly on the database as well; and a half-time programmer to make modifications as necessary.

### *Wyoming*

The Wyoming system includes both student and teacher data and as such, it is difficult to differentiate the costs of either individual system. The Department pays $135,000 annually to a vendor for maintenance. A number of Department staff also spend at least part of their time maintaining the integrated system. This staff includes a system administrator, two database administrators, and two developers. As the user interface is refined, the Department hopes to manage the entire process internally with existing staff and reduce their dependence on the vendor.

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