

92nd Arizona Town Hall
April 27-30, 2008 • Prescott, Arizona



Who will teach our children?



Ninety-Second Arizona Town Hall
April 27-30, 2008

Who Will Teach Our Children?

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When you attend the 92nd Arizona Town Hall to be held in Prescott on April 27-30, 2008, you will be joining approximately 160 citizens from all corners of the state, political persuasions and occupations to discuss and develop consensus on how best to recruit and retain quality teachers for today's students as well as the students of tomorrow.

An essential element to the success and effectiveness of these consensus-driven discussions is the background report that is provided to all participants before the Town Hall convenes. As they have so often done for past Arizona Town Halls, the University of Arizona has prepared a detailed and informative background report that will provide a unique and unparalleled resource for your Town Hall discussions.

For their dedication to creating a valuable resource for Arizona to have informed discussions on this topic, our sincere thanks are extended to UA President Robert Shelton, and Vice President and Senior Associate to the President Edith Auslander. For sharing their wealth of knowledge and professional talents, our thanks go to the many authors who contributed to the report.

Very special thanks go to Dean of Education Ron Marx who spearheaded this effort, and Professor of Education Walter Doyle who served as a contributing author, marshaled top talent to write individual chapters, and ensured all deadlines were met.

Finally, the Town Halls could not occur without the financial assistance of our generous sponsors. As of the printing deadline for this report, the sponsors of the 92nd Town Hall include the Helios Foundation (a presenting sponsor), Salt River Project, and the law firm of Snell & Wilmer.

When the Town Hall session ends, the University of Arizona's background report will be combined with the recommendations from the Town Hall into a final report. This final report will be widely distributed to Arizona public officials, community and business leaders, and many others. Together, the final report and the work of Town Hall participants will help to create solutions for the future of education.

Sincerely,

James R. Condo
Board Chair, Arizona Town Hall

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Executive Summary

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This report focuses on the issues related to the quantity and quality of teachers of Arizona's children. Information is provided concerning the number of teachers in the state, including their distribution and qualifications, and the sources of new teachers to accommodate student growth, replace teachers who leave, and support possible changes in educational programs (Chapter 1); the growth and characteristics of the student population in the state (Chapter 2); the state and federal policies that have an impact on the quantity and quality of teachers of our children (Chapter 3); the costs of teaching to both districts and teachers (Chapter 4); developments in two special areas of concern for teaching, namely, early childhood education and care and the preparation of science and mathematics teachers (Chapters 5 and 6); and challenges of leadership for teaching (Chapter 7).

Chapter 1 provides a portrait of the teaching force in Arizona.

- Approximately 60,000 teachers are employed in 237 school districts in the state.
- About 50 percent of these teachers work in the 15 districts that employ more than 1,000 teachers each.
- The overwhelming majority of Arizona teachers are white females. Eighteen percent are under the age of 30, and 30 percent are between 50 and 59 years old. A large majority of elementary-school teachers are female, whereas secondary-school teachers are split about equally by gender.
- Arizona teachers have an average of slightly more than eight years of experience and about one quarter of the teachers have spent three years or fewer in the classroom.

- In most districts, approximately 1 to 4 percent of the teachers are teaching with emergency certification and, statewide, slightly more than 5 percent of core classes are not taught by “highly qualified” teachers. These figures increase—sometimes dramatically—in fast-growing rural and exurban areas and in schools with high concentrations of poverty. The number of emergency certificates also is high in some specialty areas such as special education, secondary math, and secondary science.
- Approximately 97 percent of regular-district teachers and 88 percent of charter-school teachers meet the criterion of “highly qualified” as defined by federal No Child Left Behind legislation.
- Slightly more than 8 percent of Arizona teachers leave the classroom each year, many for personal reasons (including raising children), retirement, or career changes. Those who leave because they are dissatisfied cite poor salaries, lack of administrative support, and workload.
- Arizona has a variety of traditional and alternative certification programs for candidates who wish to be teachers. Last year the 15 approved teacher-education institutions in the state produced 3,262 of the 7,395 teachers who received certification—i.e., fewer than one half of the teachers needed in the state. The difference was made up by new teachers recruited from other states or from the pool of certified inactive teachers who reside in the state.
- Overall, Arizona probably enjoys a modest new-teacher surplus counting all of the potential sources of teacher supply. However, the distribution of qualified new teachers is considerably uneven across districts and within certain key areas such as English-language instruction, special education, math, and science.
- Several proposals have been made to help retain current teachers, attract inactive teachers back to the classroom, increase the number of teacher-education students, and employ adjunct teachers—e.g., engineers and scientists from the business community—especially in the critical areas of science and math.

Chapter 2 contains an overview of two of the key challenges facing teachers in Arizona: (1) rapid growth of the state's population, and (2) the increasing diversity of that population.

- The state of Arizona, like many states in the nation, has entered into an era of unprecedented change. These changes present numerous challenges to teachers and educators at all levels of the state education system. Two of the key challenges facing teachers in Arizona are the rapid growth of the state's population, especially among younger people, and the increasing diversity of that population.
- As the fastest-growing state in the country, Arizona experienced 75 percent population growth from 3.6 to 6.3 million from 1990 to 2007. By 2030, the population is expected to reach 10.7 million. Arizona can expect a continuation of this very fast rate of growth in a preK-12 population that already is diverse and struggling to reach high levels of academic achievement.
- More than 1 million students are enrolled in public preschool through 12th grade in Arizona. The vast majority of these students are white or Latino. Whites still constitute the largest ethnic or racial group at 46 percent, while Latinos account for 40 percent of total enrollment. Native Americans and African Americans comprise 6 percent and 5 percent respectively, while Asian Americans constitute 3 percent. In Phoenix and Tucson, Latinos now account for half of the preK-12 population.
- Arizona's students continue to score significantly below national averages in math and reading on the NAEP (National Assessment of Educational Progress) exams. Reading scores have not significantly changed since 1992, but mathematics scores in grades 4 and 8 have risen steadily since 2003, with a greater percentage testing at or above basic levels. Differences in educational attainment can be seen across schools, districts, and counties, and across ethnic groups in the state.
- More than 85 percent of high-school graduates say that they plan to pursue college degrees, and all but 10 percent of them enroll in postsecondary education. However, these high expectations translate into only limited success for low-income, lower-achieving, and first-generation college students, most of whom will

fail to obtain college degrees. This is particularly problematic at community colleges and especially relevant for black and Latino students, of whom more than half drop out of college.

- The minimum requirements for graduating from high school do not qualify Arizona students for admission to its state universities. Fewer than half of Arizona high-school graduates are eligible for direct admission from high school into the state universities due to the fact that so many students fail to take all of the required courses for admission.
- Meeting the expanding needs of its student populations, including the need to be better prepared to participate in our changing information-driven, global economy and to succeed in postsecondary pursuits is a continuing challenge for the state.

Chapter 3 addresses policy and practice in the key areas of teacher certification, teacher preparation, support for new teachers, professional development, teacher standards and assessments, and teacher evaluation in Arizona.

- The standardization of teacher preparation and licensure began in the 1930s with the National Teacher's Exam and in the 1950s with the establishment of the National Council for Accreditation of Teacher Education (NCATE).
- Teacher certification in Arizona is under the jurisdiction of the State Board of Education and implemented by the Arizona Department of Education. Arizona teacher-education programs are evaluated under regulations set in 2006, and programs must be aligned with state standards.
- In the 2008 "Quality Counts" report, Arizona received a D plus in the Teaching Profession category. The national average was C. The story from this assessment, however, is narrow in scope. Because this evaluation focuses on a designated range of state policies, it overlooks prevailing practices in many teacher-preparation programs and school districts and does not always account for some of the flexibility that is built into the Arizona system.

- Arizona is successful at providing some creative incentives for talented teachers, but these tend to be local or limited state projects and not part of a larger system of ensuring overall teacher quality, particularly in high-needs districts and schools.
- It is estimated that teacher attrition costs Arizona more than \$88.5 million annually. Programs for supporting and mentoring teachers early in their careers have shown that they can dramatically reduce the typical loss of beginning teachers during their first six years of teaching. It is estimated that every dollar invested in a quality induction and mentoring program (such as those that meet the standards of the New Teacher Center at the University of California Santa Cruz) returns \$1.66 in cost savings over five years.
- Despite recommendations from several prestigious statewide commissions and reports, induction and mentoring practices are inconsistent across Arizona schools. Some initiatives, such as Career Ladder plans, the Master Teacher Mentor program, and training for mentors in alternative pathways to certification programs, reach between 40 percent and 45 percent of new teachers in the state. Data indicate that the high-quality programs have increased overall teacher retention and new-teacher retention.
- Professional development activities, which are defined primarily by individuals or districts, are provided largely by local districts or county offices and vary widely across the state. The state board requires 45 to 60 hours of instruction in sheltered English immersion (SEI) strategies and 180 hours of standards-based professional development for certification renewal. Few districts can report costs or time allocations to professional development. Medium and large districts provide more opportunities at a lower cost to teachers than small or isolated districts. While there are many opportunities for professional development through a variety of agencies, there is little coordination of opportunities or information and no consistent funding for professional development.
- Arizona law requires teachers applying for a certificate to pass a proficiency examination in subject matter and professional knowledge, and to complete coursework or an examination on the United States and Arizona constitutions in

order to be certified. This content and professional knowledge test is called the Arizona Educator Proficiency Assessment (AEPA).

- Arizona is a state with a growing student population and an aging teaching population. Preparing now for the next decade will ensure our communities have the quality teaching force all of our students deserve.

Chapter 4 addresses the current structure of school finance in Arizona, compensation rates for teachers, recruitment and retention issues, and suggestions for possible new ways to look at teacher pay.

- Arizona school finance is known as one of the most complicated financial structures in the country.
- Arizona appears at the bottom of most lists in terms of school funding as compared to other states. Teacher pay in Arizona is at the lower end of the scale compared to other states, and teacher pay within Arizona varies according to geographic location, and size of the city or town.
- The state has recently mandated changes in English-language instruction and high-school graduation requirements, but the cost of these mandates has not been clearly specified.
- The cost of the college education to prepare to teach relative to the salary that will be offered can cause a lack of attractiveness for the teaching profession.
- Overall, teachers have been paid on a set-salary schedule with increases based on years of service and number of college credits. During the past 20 years, various differentiated pay structures for teachers have been attempted. Arizona Career Ladder, now in 28 districts, is one of the most long-standing performance-pay structures in the country.
- Many would argue that there is a general need to offer wage premiums to teachers who are willing and able to teach in schools in areas of poverty which tend to have

the least-qualified and least-experienced teachers. A second area of need is in certain subject areas, such as science, math, and special education.

- The United States Department of Education has awarded grants to design and implement performance-based pay structures for both teachers and principals, one of which was given to the Amphitheater Unified School District in Tucson.

Chapter 5 turns attention to a significant area of concern among policymakers and education practitioners in Arizona, namely, early childhood education and care (children from birth to age 8).

- There is a growing awareness of the personal, educational, and economic benefits of providing high-quality early childhood education and care.
- Data from 2005 indicates that there are more than 500,000 children in Arizona younger than age 6 and 55 percent of these children have parents in the workforce. Families in the state pay an average of \$5,876 per year for center-based childcare for a 4-year-old.
- The quality of early childhood education and care varies widely across the state. Most poor children—almost one in four Arizona children 5 and younger live in poverty and attend programs of such low quality that their learning and development are in jeopardy. State policy governing early childhood education and care do not always promote quality programs. Arizona does not have a mechanism for providing diverse families of young children with information and resources about early education and care.
- There are no comprehensive data across agencies on what Arizona’s children look like when they enter kindergarten, making it difficult to plan programs and services.
- The early childhood workforce in Arizona ranges from people with a high-school diploma or less to those who have a bachelor’s degree or higher. Providers may be grandparents or other relatives, teachers in a privately-owned care center, or

teachers in a public school. In order to meet the minimum-licensing requirements set by the Arizona Department of Health, early childhood providers must be 18 years old, have a high-school diploma or equivalent, and have six months of experience in providing childcare. Only 15 percent of Arizona's licensed childcare centers have been accredited by the National Association for the Education of Young Children (NAEYC).

- In 2004, the state board created an Early Childhood Education Certificate and/or Endorsement. By July 1, 2009, all public schools serving children birth through kindergarten must have this certificate. The certificate is optional but recommended for teachers in public-school grades first through third.
- In Arizona, early childhood education and care teachers earn salaries that place them at the federal poverty level for a family of four. As a result, it is difficult to recruit and retain highly educated teachers.
- There is no comprehensive, cross-agency data collection in Arizona that can provide accurate information regarding the number of children served, the number eligible, the number of programs or teachers, and other information needed for program and service planning.
- There are several policy issues that should be kept in mind as the state engages in earnest conversations about increasing the rigor of early childhood professional development programs. These include capacity (Will there be a sufficient number of qualified personnel?), costs of high quality (Can programs afford increases in costs for salaries, etc.?), and access (Will early childhood caregivers have access to high-quality coursework?).

Chapter 6 focuses on a second area of significant concern, namely, the preparation of middle- and high-school teachers of math and science. The discussion is framed around the search for a comprehensive strategy for the recruitment, training, and retention of highly proficient teachers in these areas, increasing the pool of candidates to ensure the availability of

excellent personnel to all communities in the state.

- The recruitment and retention of qualified math and science specialists for middle and secondary schools is an acute problem, and the shortages are especially severe in rural and high-poverty urban districts.
- When states increase content and pedagogy requirements for teachers they increase the number of applicants and the quality of instruction for all children. But more targeted effort is needed, including extensive recruitment campaigns to identify and give scholarships to promising candidates starting with high-school students, increases in teacher salaries, and programs of support and induction to retain qualified teachers. Other creative strategies exist for attracting teachers in these areas.
- Retaining and supporting effective math and science teachers in-district is a key strategy for successful teaching. This may require seriously tackling the use of incentives for teachers in subject-matter specializations where there is chronic need, the provision of professional development support, and the redesign of school climate to foster a positive workplace for secondary teachers so that they do not become frustrated and leave the profession.
- Teachers who have a deep grounding in the foundational concepts of their subject matter are able to think more creatively about the content they are teaching and are more able to capitalize on student reasoning to design instruction.
- Only about 50 percent of the practicing middle- and high-school teachers in Arizona have an academic major in the subject-area they are teaching, in part because middle-school teachers can have elementary (K-8) certification. Also, within the 120 total credit-hour cap in Arizona universities, there is limited room for concentrated study of academic content that is directly related to the school curriculum. Finally, science and math departments are often focused on weeding out students rather than nurturing excellence, thus discouraging many students from majoring in these fields.
- Creating middle-school certification for teachers in this level and academic minors for elementary-school teachers would increase the subject-matter preparation for these teachers.

- For the Arizona economy, improved teacher preparation in the authentic use of technology in science, business, entertainment, and other applicable fields is critical.
- Creating close working relationships between preparation programs and practicing schools and teachers is essential for achieving quality teaching.

Finally, schools face enormous challenges as the features of a global marketplace collide with established cultural norms and conventions. Chapter 7 examines issues related to how leadership can support quality teachers in Arizona schools.

- American educational institutions must adapt to the demands of modern society if they are to prepare students to meet the challenges of an increasingly complex environment.
- Considering the fact that the majority of the state budget is spent on K-12 education, it is clear that Arizona's system cannot adequately fund public schools.
- Teaching increasingly diverse student populations requires higher levels of collaboration by all members of the school institution. It is essential that leadership be distributed across districts, schools, and classrooms. Distributed leadership, however, tends to be discouraged in the face of increasing demands for institutional compliance to external standards and regulation. Identifying and recruiting school leaders becomes, therefore, increasingly difficult.
- Among other considerations, arguments in favor of school-leader certification are supported by research that finds superintendents' understanding of teaching and curriculum greatly influences students' achievement. Arguments for nontraditional school-leader recruitment emphasize that the conventional pathway has not provided a sufficient number of effective fiscal and organizational managers.
- There is an acute shortage of qualified applicants for principal and superintendent positions in the state, and the problem varies by such factors as location, condition, reputation, and salary. The number of candidates applying for virtually all central-administrative openings is roughly one quarter of the demand for leaders.

- Decisions about any aspect of school operations require information that is adequate, understandable, and accurate.

Introduction

Walter Doyle and Ronald W. Marx

This collection of background papers addresses (from several perspectives) the formidable challenges of attracting, preparing, and sustaining high-quality teachers for Arizona's schools. These challenges are daunting in part because of the sheer number of teachers needed to educate a quite-diverse population of more than one million students from preschool through high school in a variety of urban, exurban, and rural communities across the state. In addition, discussions of who should teach our children are infused with strong personal images and deeply held political beliefs. As a result, proposals for action to ensure quality schools—rigorous standards, high-stakes assessments, tax incentives and increases, merit pay, school choice, privatization, vouchers, and collective bargaining, for example—tap into intense feelings and readily stir controversy.

Teaching is the largest profession in the United States. There are more teachers than there are doctors, lawyers, architects, and the like. Astonishingly, there are even more teachers than secretaries and administrative assistants¹. Moreover, teachers seldom interact with most professionals. Few teachers have much contact with lawyers or architects in our lifetimes and we typically see our doctors only a couple of times a year at most. But our children see teachers every weekday for some 180 days each year, just as we did when we were in school. So we know a lot about teachers and their virtues and foibles.

When most of us think of teachers, we often recall the inspirational one or two individuals who gave direction to or changed our lives as children or teenagers. Such memories are fraught with emotion. Many of us are thankful for those teachers who have

touched our lives and often we return to visit and ask advice from those outstanding educators. The cover story in the February 25, 2008, issue of *Time* on how to make great teachers, for example, opened with “We never forget our best teachers...” The reporter went on to extol the exceptional virtues of the two exceptional teachers she was lucky enough to have known in high school.

This anchoring of our understanding of high-quality teaching in the exceptional attributes of a few individuals implies that good teachers are quite rare and that most teachers are at best, unexceptional, or at worst, terrible. It is not surprising, then, that casual talk about teachers easily drifts to complaints about bad teachers and what can be done about them. Like our memories of excellent teachers, our recollections of exceptionally poor teachers are laden with emotion. If these teachers are destructive of children through ridicule or if they are lazy and uncaring, we are justifiably angry. There is no place in education for such people, and public sentiment ought to be strong.

Moreover, deep down many people probably believe that truly exceptional individuals are born, not made. Many are skeptical, therefore, of claims that teacher-education or professional-development programs can produce what great teachers seem to do naturally. The untrained outsider who saves the day—such as the violin teacher played by Meryl Streep in the movie, *Music of the Heart*—is a common theme in popular culture.

The policy implications of this stance are clear and powerful. If we believe that only a few teachers are truly outstanding, then we will want surveillance and accountability for most teachers and merit systems to reward the exceptional few. And if we believe that teacher education is of limited worth in producing good teachers, we will seek to heavily regulate traditional programs and their graduates—colleges of education, for instance, are the only

professional schools required by federal law in the Higher Education Act to report publicly the rates at which their teacher-education students pass state assessments. At the same time, we will create ways for naturally gifted teachers to bypass teacher education altogether. We might even come to believe that certification requirements are a barrier to quality teaching and, thus, those who avoid teacher education are, by definition, likely to be better teachers.

Despite the intrinsic power of this scenario, the realities of achieving a sufficient quantity of high-quality teachers for the state exist on a substantially larger scale. Arizona has nearly 60,000 public school teachers. Roughly 10 percent of these teachers are replaced each year with new teachers, and Arizona teacher-education programs supply only about one half of these new hires. Among beginning teachers, nearly half leave teaching within the first five years, often before they have had sufficient experience to master their work. Teaching is a knowledge profession. Regardless of one's stance on the question of whether teachers are made or born, it is clear that teachers' work involves knowledge and information. Research on expertise in such professions suggests that it can take thousands of hours of study and focused practice, something on the order of a decade of work, to gain high levels of specialized proficiency.² Unfortunately, with the large number of teachers needed every year, our schools have to recruit many beginners into teaching. The result of this recurring need for new teachers is that large numbers of our children are by necessity taught by novices who are just learning their craft.

Finally, the existing teaching talent is not equally available to all students in all areas. Real shortages of qualified teachers exist in special education, English-language learning, science, and mathematics, and these shortages are likely to be especially large in fast-growing areas, remote rural schools, and schools that serve large numbers of poor children. Moreover,

Arizona is situated in a national labor market for teachers and we must compete for teaching talent in this market of about 3.6 million teachers. These realities call for creative efforts across the political spectrum.

Complicating the problem further is the inherent difficulty of measuring quality in teaching. We all know that some teachers are better than others, so it should be easy to tell the good ones from the bad ones or to describe what good teachers do so that all teachers can learn to be “above average,” as are the children in Garrison Keillor’s “Lake Wobegone.” But clear answers to this question of teaching effectiveness have been elusive, despite nearly 100 years of research. Between the extremes of wonderfully talented and charismatic teachers and people to who hate children and schools, it is difficult to differentiate reliably among the vast pool of teachers in the middle.

Part of the problem is that effectiveness is, as noted, quite personal and can vary by context. A classmate may well have seen your best teacher as one of his or her worst teachers. Moreover, effectiveness is achieved locally with particular students in a particular classroom, and many factors—curriculum, resources, student aspirations, family support systems, peer influences—contribute to the outcomes of a class. Furthermore, schools in Arizona are highly stratified by income and social class, and teachers understandably differ in their effectiveness with the range of students in these schools. Finally, classroom teaching itself is very complex. As Linda Darling-Hammond notes:

Studies of teaching ... describe it as complex work characterized by simultaneity, multidimensionality, and unpredictability. In classrooms competing goals and multiple tasks are negotiated at a breakneck pace, trade-offs are continually made, unanticipated obstacles and opportunities arise. Each hour of every day teachers must juggle the need to create a secure, supportive environment for learning with the press for academic achievement, the need to attend to individual students and the demands of the group, and the challenges of pursuing

multiple strands of work so that students at varying places in their learning move ahead and none are left behind.³

This complexity can challenge even the most skillful and dedicated teacher. The same circumstances also make it difficult to construct situation-free indicators of teaching quality.

Most agree on the essential knowledge and skills a teacher needs: deep knowledge of the subject or subjects one is to teach; an understanding of learners and learning; competence in instruction, assessment, and classroom management; and an ability to relate to children and parents. But defining these broad areas with the precision necessary for careful measurement is not easy and it is difficult to guarantee that scores on a test of these domains will predict quality. Similarly, we can gather information about various qualities of teachers—what they know, what their grades are, what kinds of experiences they have had—but teaching quality, that is, how things actually play out during classroom lessons, is more difficult to capture.

With these factors in mind, we have tried to bring together (in the following chapter) experts on a range of issues that influence decisions about achieving high-quality teachers across the range of Arizona schools. To address the question of who should teach our children it is first necessary to know who teaches and who is being prepared to join the ranks of Arizona teachers. Chapter 1 begins this report, therefore, with statistics about the size of the teaching force, the supply of teachers available for schools, and the general qualifications of those who would teach our children. The question of who should teach our children also requires a perspective on the children who are being taught. Chapter 2, therefore, contains a broad survey of the size, diversity, and aspirations of student populations across Arizona. The report then turns to aspects of the broad question of teachers and their qualifications. Chapter 3 gives an overview of state policies and programs designed to influence the quality of Arizona's teachers. Chapter 4 covers the costs of teaching for the state, school districts, and teachers

themselves, and includes information about differential salary plans to attract and retain quality teachers. The next two chapters single-out two important areas of policy and program initiatives: Chapter 5 focuses on early childhood education and care which has important implications for student success, and Chapter 6 concentrates on acquiring and retaining qualified teachers for the significant areas of science and mathematics. Finally, Chapter 7 turns attention to leadership for teaching and school and district levels.

Chapter 1

The Teaching Force in Arizona

Walter Doyle and Molly Romano

An understanding of the question, “Who will teach our children?” begins with a perspective on the teaching force in Arizona. The portrait of the teaching force presented in broad strokes in this chapter is seen to have two parts: (1) those currently teaching in schools and (2) those who are available to replace existing teachers. The chapter begins, therefore, with an overview of the size and characteristics of those who are teaching in the state. Attention then turns to the pool of potentially available teachers who can replace those teachers who leave the classroom for whatever reason: retirements, personal or family reasons, further education, promotions, and the like. Throughout the discussion we will examine various types of information about the qualifications of current and future teachers.

At the onset, it is important to note that precise numbers concerning the size and other characteristics of the teaching force are not available, in part because counting is difficult and records are either incomplete or change continuously. Although the quality of school and teacher data in the state may improve substantially — in August, 2007, the Arizona Department of Education received a nearly \$6 million federal grant to create an Arizona Education Data Warehouse — precision is not the central issue here. What is more important for deliberating about policy is a broad understanding of the scale of the enterprise: how many teachers are there, where do they work, etc. All figures given in this chapter, although approximations, are intended to provide this sense of scale.¹

Who is Teaching in Arizona?

In this section we examine two aspects of the teaching force in Arizona: (1) the size and distribution of the teaching force and (2) the qualifications of these teachers, including certification status and related information.

Size and Distribution

Using data reported by the National Assessment of Education Progress (NAEP) and 2007 figures from the Arizona Department of Education (ADE), the following general overview of public schools, teachers, and students can be constructed for Arizona:

- Number of regular school districts (charter schools not included): 237
- Number of schools: 1,927
- Number of public school teachers: 59,397
- Number of students: 1,094,454

As one might expect, the distribution of teachers tends to be concentrated in the major metropolitan centers. Fifteen districts in Arizona have more than 1,000 teachers and, of these, four have more than 2,000 teachers and two have more than 3,000 teachers. Nearly 50 percent (or 27,700) of Arizona's teachers are employed in districts with more than 1,000 teachers. The remaining teachers are distributed over the 220 or so smaller districts in the state. Nearly 30 districts (including charter schools) in Arizona employ 10 or fewer teachers.

In 2007, approximately 75.75 percent of these teachers were female, 18 percent were younger than age 30, and nearly 30 percent were between age 50 and 59. A large majority of elementary school teachers were female. In secondary schools, roughly 45 percent of the teachers were male and 55 percent female. Table 1.1 provides information about the ethnicity

of Arizona’s teachers in 2007. The overwhelming majority of teachers are white, in contrast to the profile of students in Arizona schools (see Chapter 2 of this report).

Table 1.1
Public School Teacher Population by Ethnicity
(2007)

	Percentage
White	83.62
Hispanic	10.96
Black	2.69
Native American	2.12
Asian	1.18

Source: Arizona State Department of Education. School District Employee Report, School Year 2006-2007, Position by Ethnicity and Gender Report.

Not all who teach our children in Arizona are employed in traditional public school settings. The approximately 470 charter schools in Arizona enroll around 95,000 students (roughly 8.7 percent of the total number of students in the state) and employ an estimated 4,750 teachers. Charter schools are public schools that are operated under a specific authorization or “charter” by the Arizona State Board for Charter Schools or the State Board of Education and are exempt from many state education laws (for example, teachers in charter schools are not required to be certified). About 75 percent of the charter schools operate in Maricopa and Pima Counties, accounting for some 3,500 teachers. About 50 percent of the charter schools in Arizona serve K-8 students, 31 percent serve students in grades 9-12, and 19 percent operate with a combination of K-12 grades. A majority of these schools are quite small — around 50 percent have enrollments of 150 or fewer students. The number of charter schools has stabilized in recent years after a period of rapid growth from 1996 to 2004. However, student enrollments are slowly but steadily increasing.

In addition to charter schools, there are 616 private schools in Arizona enrolling approximately 11 percent of the school-age population. The number of teachers employed in private schools is unknown but they are less likely than their public school counterparts to be certified. According to the National Center for Education Statistics (NCES), in 2003-04 approximately 87 percent of public secondary school teachers in the nation, for example, had regular certification compared with 43 percent of private-school teachers. At the same time, private schools often have the reputation of being “better” than their public school counterparts, although comparisons are difficult because private schools draw from a select population of students. In addition to private schools, national data indicate that about 2.2 percent of school-age children are home-schooled and thus usually taught by parents. In Maricopa County, for instance, it is estimated that there are 7,000 home-schooled children. Compared with their public school peers, home-schooled students are more likely to be white, have two or more siblings, have two parents in the household but only one in the labor force, and have parents with a bachelor’s degree or higher. Finally there are 54 federal Bureau of Indian Affairs schools in the state.

The Qualifications of Arizona Teachers

Teacher quality can be measured by a number of indicators: degrees or certifications earned, years of experience, scores on professional knowledge tests, and the like. Valid measures of teaching quality — how well teachers perform in the classroom — are considerably more difficult to obtain, although efforts in that regard are being made across the state in the implementation of performance-pay programs (see Chapter 4 of this report). In this section, we focus on broad indicators of the quality of the teaching force in Arizona.

In 2007, roughly 33,089 of Arizona’s public school teachers had a bachelor’s degree, 25,562 had a master’s degree, 550 had doctoral degrees, and 124 had no degree. In the same year, the average years of experience for certified teachers in Arizona was 8.1338. The distribution of experience, however, provides an interesting picture:

Number of Years Experience	Number of FTE-Certified Teachers
1	5,909.26
2	4,650.39
3	3,665.81
4	3,145.27
5	2,914.97
6	3,025.53
7	2,788.04
8	2,503.70
9	2,233.17
10	1,958.61
11	1,831.98
12	1,692.12
13	1,515.31
14	1,401.02
15-plus	12,905.57

These numbers suggest that about 14,225 or 26 percent of Arizona’s teachers have fewer than three years of teaching experience. They also indicate that approximately 3,000 or 50 percent of first-year teachers do not continue teaching after four years, and the decline in numbers of teachers continues more slowly but steadily as teachers grow older. We will return to the topic of teacher retention later in this chapter.

Teacher certification in Arizona, as in other states, is based on the completion of a bachelor's degree and, either within the degree program itself or after it is received, a state-approved program that broadly includes general education requirements, specialized subject-matter courses, professional education courses and field experiences, and student teaching (for more details, see Chapter 3 of this report). In recent years, teachers seeking to be certified also must pass the Arizona Educator Proficiency Assessment (AEPA) professional knowledge and subject knowledge tests in the content area of their teaching assignment.

Arizona Department of Education figures for 2007 indicate that 3.8 percent of teachers statewide held emergency certification — that is, they did not meet some part of the state certification requirements for teaching in conventional public schools. These percentages increase to around 6 percent in fast-growing exurban districts, economically depressed or remote rural areas, schools serving Native American students, and in some districts reach 35 percent or more. The number of emergency certificates also is high in some specialty areas such as special education (approximately 10 percent), secondary math (5.3 percent) and secondary science (4.2 percent).² The implication of these data is that some students are not being taught by fully qualified teachers.

The federal No Child Left Behind legislation mandates that employed teachers must be considered “highly qualified” to teach in the specific subject area to which they are assigned. In other words, “highly qualified” is a label that refers to the match between a teacher’s qualifications and the teaching assignment he or she is given. A certified, experienced history teacher who is teaching math would not be considered “highly qualified” to teach math. In August 2003, the State of Arizona adopted an evaluation procedure for Arizona “highly qualified” teachers. The three main evaluation criteria are:

- 1) Whether the teacher holds a bachelor's degree.
- 2) Whether the teacher holds a valid state teaching certificate and for what levels.
- 3) A teaching assignment with evidence of competency for this placement.

The third criterion requires that teachers meet at least one of the three following conditions: (1) passing the AEPA Professional Knowledge and Subject Knowledge test in the content area of teaching assignment, (2) holding an advanced degree in their content area, or (3) holding national board certification in the area of their teaching assignment.

The 2006-07 state report card indicated that teachers who do not meet the “highly qualified” criteria as prescribed by NCLB were teaching 5.3 percent of core academic courses. The majority of these were middle school educators (grades 6-8) and special education teachers who had not yet completed AEPA assessments in content areas they were teaching or who were elementary certified and do not yet have the content and professional experience to meet the “highly qualified” criteria on Arizona’s Highly Objective Uniform State Standard of Evaluation (HOUSSE). However, in high-poverty schools the aggregate state figure was 7.5 percent compared to 2.6 percent in low-poverty schools. In some districts, especially in rural areas, the figures ranged from 10 percent to more than 35 percent.

Charter school teachers in Arizona are not required to be certified, which is a baseline criterion for “highly qualified,” so these teachers must meet the NCLB criteria by passing AEPA or HOUSSE. In the first year of self-reporting, charter schools reported that 88 percent of their teachers were highly qualified, compared to 97 percent in district schools.

Teacher Attrition and Migration

The overall characteristics of the teaching force are influenced in part by how many teachers remain in the classroom and how many leave teaching each year. In this section we

examine in general what is known about the patterns of attrition and migration of teachers in Arizona. Programs for increasing teacher retention are treated in greater detail in Chapter 3 of this report.

The 2003 Morrison Institute report on teacher supply and demand³ in Arizona estimated an average annual attrition rate for 2006-2010 as follows:

Retirement	850
Leaving Profession	1,990
Leaving Arizona	1,720
Attrition Total	4,560

These data suggest that approximately 8.3 percent of the teaching force leaves the classroom each year, which is close to the national average of about 10 percent (NCES). According to the Bureau of Labor Statistics, the “separation” rate for professional and business services was near 4.5 percent for the past year.⁴

Little information is available about the movement of teachers among schools and districts in Arizona. National figures indicate that approximately 8 percent of teachers transfer schools at the end of each year and less-experienced teachers are more likely to request transfers. There also is a lack of information gathered by schools or school districts about the reasons teachers leave or migrate. The authors of the Morrison Institute Report on teacher supply and demand in Arizona suggests the following general factors:

Personal reasons or life choices	24 percent
Retirement	21 percent
Different type of job	19 percent
Disillusionment or stress	16 percent
Salary	10 percent
Administration or bureaucracy	6 percent
Respect, support, or discipline	3 percent

Retention of new teachers in the teaching profession is an issue of national concern. According to the National Commission on Teaching and America's Future, the national attrition rate among new teachers ranges from 35 to 50 percent during the first five years of practice.⁵ By other accounts, as many as 20 percent of public school teachers in the United States leave the profession within the first three years of teaching, with 9.3 percent not even completing the first year.⁶

Reasons given by those who leave teaching primarily due to dissatisfaction have been documented primarily as:

- a) Poor salary
- b) Lack of administrative support
- c) Workload

Dissatisfaction with salary was confirmed on a local level through Governor Napolitano and the Arizona Education Association's recent survey of working conditions.⁸ In general, respondents were positive about their working conditions, although financial considerations played a large role in the career decisions of those new to the profession. As a group, novices tended to cite finances as a major consideration for leaving the profession.

Administrative support and professional development appear to also play a role in satisfaction and retention. Arizona teachers report wanting more help in working with students with disabilities, closing the achievement gap, and helping English-language learners.⁹

Retention of teachers is a particularly critical issue in certain schools and areas, as a significant number of teachers are moving to different schools or leaving the profession each year, with particularly high numbers for small schools, urban schools, and schools serving high-minority, high-poverty populations.¹⁰ In fact, Darling-Hammond and Sykes have

reported that teachers in high-poverty schools are twice as likely to leave the profession.¹¹ In Arizona, schools in rural areas and low-income urban areas are experiencing the most difficulties in attracting and retaining qualified teachers.¹²

Who Is Available to Teach Our Children?

Up to this point we have concentrated on the characteristics of the existing teaching force in Arizona. We now shift attention to (1) the demand for teachers in the state and (2) the mechanisms available for maintaining a continuing supply of high-quality teachers for our children. This shift, by establishing a link to higher education, broadens the scope of the discussion from a focus on P-12 schools to a comprehensive look at the P-16 system. The quality of P-12 teaching is partly a consequence of the commitment of higher-education institutions to teacher preparation and, in turn, the quality of P-12 teaching affects the quality of the students who enter college and the preparation they receive as they become teachers.

Teacher Supply and Demand

In January of 2003, the Morrison Institute for Public Policy published a comprehensive analysis of the supply and demand for certified teachers in Arizona.¹³ The research team projected the output of Arizona's teacher-preparation institutions, analyzed the prospects for certified teachers migrating into the state, and interviewed a random sample of 804 certified teachers who were not teaching at that time. When comparing that data with their projections for Arizona's student population through the year 2010, the researchers concluded that statewide there is likely to be a small surplus of teachers. They based this conclusion first on an estimated annual demand of 5,980 teachers derived from projections of student growth

(requiring 1,420 new teachers) and teacher attrition (4,560 teachers each year). They then calculated the supply of teachers from:

Graduates of Arizona teacher-preparation programs	2,670
Teachers migrating into the state	2,880
Available inactive certified teachers	1,380
Total Supply	6,930

This analysis yielded a surplus of some 950 teachers annually in the state. This estimate of a surplus depends, however, on the actual number of graduates who remain in Arizona to teach. As Markel points out, a comprehensive database does not exist concerning employment patterns for graduates from Arizona’s teacher education programs.¹⁴ We do not know what percentage of graduates do not go into teaching or how many leave to teach in other states. Further, there is no data on retention rates in either teacher-preparation programs or early career support programs in schools. Projections of a surplus also are dependent upon school district policies on class sizes and on how many inactive certified teachers actually decide to join the teaching force. Finally, the estimate of the potential pool of available new teachers yields about 1.2 applicants for each opening, giving school districts few options when selecting qualified new teachers.

The Morrison researchers also found considerable disparity across regions of the state and within specific teaching areas. Fast growing exurban and rural areas of the state have a much greater demand for new teachers. Moreover, specialization areas such as special education, limited English proficiency, science, and math represented the most critical areas for a potential teacher shortage. From a national perspective, Cochran-Smith has pointed out that although teacher shortages are not new, there are a few new considerations in recent years including:

- 1) The requirement that all teachers in all schools be “highly qualified.”
- 2) The realization that teacher recruitment is not as much of a problem in staffing schools as is teacher retention.
- 3) The growing evidence that teacher retention is most difficult to obtain in hard-to-staff schools.¹⁵

The Preparation of New Teachers

Arizona has 123 approved education-preparation programs in particular specialty areas, 95 for teachers and 28 for administrators and others. There are 15 institutions in Arizona approved to offer some or all of these programs: six public universities, six private universities or colleges, and three community colleges. More than one-third of these programs constitute alternative or nontraditional routes to certification that allow candidates to prepare for teaching in a variety of ways. In addition, in 2004-2005 the state board approved the Teacher Preparation Program Intern Teaching Certificate (TTP) that allows for contracted teaching internships. The TTP is a two-year program designed for elementary, middle grades, and special education candidates. This pathway has partnerships with five institutions of higher education and numerous school districts and charter schools.

In addition, there are approximately 300 Teach for America students teaching in the Phoenix area. This program is designed to recruit recent college graduates to make a two-year commitment to teach in economically disadvantaged locations. Participants receive five weeks of preparation, in partnership with Arizona State University, during the summer prior to their first year of teaching.

Northern Arizona University (NAU), Arizona State University-Tempe (ASU), University of Phoenix (UP) and The University of Arizona (UA) prepare 73 percent of the

state's total output each year, with NAU and ASU preparing 21 percent and 19 percent respectively. The remaining programs, therefore, tend to be relatively small.

There were 3,262 teachers prepared in Arizona in 2005-2006 who took the Arizona Educator Proficiency Assessment (AEPA) in order to be eligible for certification, and the aggregate pass rate was 92 percent. Arizona issued 7,395 new certificates to a combination of new educators in their first year of teaching and teachers coming from other states with teaching experience. In other words, Arizona's teacher-education institutions produce fewer than half of the teachers certified in the state. There were 1,613 emergency certificates (NCLB waivers) issued primarily in elementary education, special education, math, and science. Table 1.2 represents the number of teacher-certification candidates from Arizona institutions that completed certification assessments in 2006-2007 and key subjects or areas in which they completed them. The complete report is available at www.title2.ed.gov.

Table 1.2
Arizona Teacher Certification Candidates
Completed Certification Assessments 2006-2007
by key subjects/areas completed

Assessment	Number Taken	Number Passed	Percent Successful
Professional Knowledge	3975	3836	96
Academic Content	3437	3187	93
Special Education	365	339	93
Elementary Education Professional Knowledge	2775	2666	96
Elementary Education Content	2475	2299	93
Biology	83	71	86
Chemistry	21	19	90
Physics	12	11	92
Math	115	113	98

Retention of Teachers

Retaining those who already are teaching can create an obvious source of qualified teachers. One possible way to improve teacher retention is through creation and support of induction programs — special mentoring and support during the first years of teaching — and professional development programs tailored to teacher needs at later stages of development. A more comprehensive discussion of such programs is contained in Chapter 3 of this report.

Inactive Certified Teachers

In addition to recommending an increase in the output of teacher-education programs and the streamlining of certification requirements, the authors of the Morrison Report suggest that inactive certified teachers constitute an important source of qualified personnel for Arizona's classrooms. Their data suggest that these teachers might be attracted back to teaching by upgrading working conditions through such means as increasing financial incentives (including salaries, tuition reimbursements, loan deferments, incentive pay in high-needs areas, and the like), reducing class size and the paperwork burden, and providing more support for planning and instructional innovation.

Adjunct Teachers

One final source of teachers involves the employment of adjunct teachers in targeted courses. This proposal might mean, for example, hiring an engineer or scientist from the local business community to teach one or two classes in math or science. Local experts, such as poets, historians, or business leaders, could also staff other specialty areas. Such teachers would potentially bring needed expertise in content areas and would allow the district to use its limited resources wisely. At the same time, this

proposal would need to be examined in light of state certification rules and the federal requirements for “highly qualified” teachers.

Summary

This sketch of Arizona teachers suggests that a well-educated and dedicated cadre of classroom teachers staffs Arizona schools, and that there is a reasonably adequate supply of qualified teachers to fill available classroom vacancies. On the other hand, there are some significant sources of concern. In particular, the availability of high-quality teachers is dramatically uneven across geographical regions of the state and within certain key educational areas such as English-language acquisition, special education services, and science and math instruction. Moreover, will the adequacy of the teaching force and the availability of new teachers match both the quantity and the character of the projected growth Arizona is likely to experience in the coming years? Finally, can we envision a revitalized educational system for Arizona that adequately meets the needs of all children and inspires them to achieve their highest goals in the 21st century?

Chapter 2

Opportunities and Challenges for Teaching

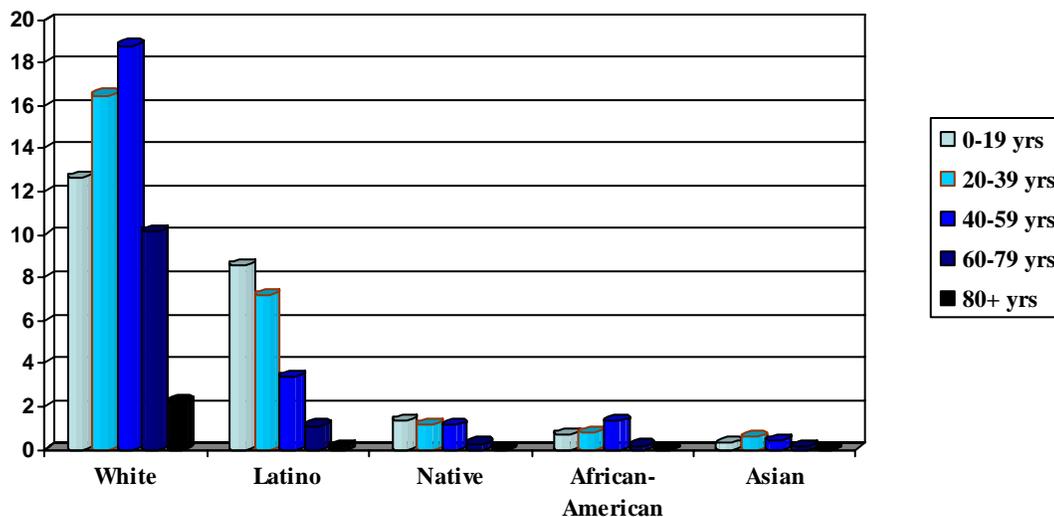
Regina Deil-Amen, Cecilia Rios Aguilar, Jeffrey F. Milem¹

Key Points

The state of Arizona, like many states in the nation, has entered into an era of unprecedented change. These changes present numerous challenges to teachers and educators at all levels of the state's education system. Two of the key challenges facing teachers in Arizona are the rapid growth of the state's population and the increasing diversity of that population. Many of Arizona's most critical and controversial educational issues have emerged within the context of massive demographic shifts. The state would benefit from recognition of these transformations and a forward-thinking approach that carefully anticipates and contemplates effective future directions for education and teaching. Arizona's population is relatively young and diverse, with the aging population remaining heavily white and the younger population rapidly increasing in the proportion of Latinos (see Table 2.1). This transformation in composition coupled with the rapid growth of the population as a whole has important implications and will therefore occupy a central role in this chapter.

As the fastest-growing state in the country, Arizona experienced a 75 percent population growth from 3.6 to 6.3 million from 1990 to 2007.² By 2030, the population is expected to reach 10.7 million.³ Arizona can expect a continuation of this very fast growth rate in a K-12 population that already is diverse and struggling to reach high levels of academic achievement.

Table 2.1
Percentage of Arizona's Population by
Age Groups and by Race or Ethnicity



Source: U.S. Census Bureau (2000)

Differences in attainment are evident across counties (see Table 2.2). Meeting the expanding needs of these populations to be better-prepared to participate in our changing information-driven global economy and to succeed in postsecondary pursuits, could be among Arizona's top priorities.

Profile of Student Populations

Enrollment and achievement patterns

“Arizona’s large minority student population is a valuable resource that we must cultivate.” (Lattie Coor, Chairman and CEO of the Center for the Future of Arizona)

More than 1 million students are enrolled in public preschool through 12th grade in Arizona. The vast majority of these students are white or Latino. Whites still constitute the largest ethnic or racial group at 46 percent, while Latinos account for 40 percent of total

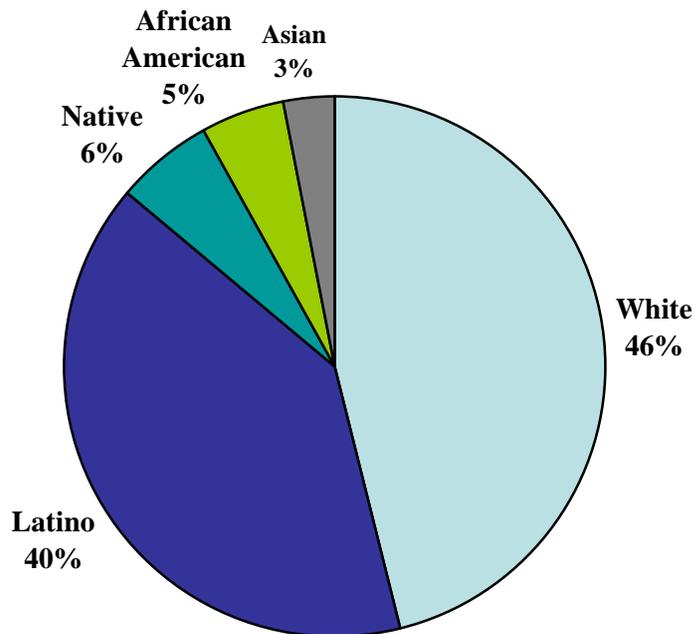
enrollment. Native Americans and African Americans comprise 6 percent and 5 percent respectively, while Asian Americans constitute 3 percent.⁴

Table 2.2
Educational Attainment in Arizona by County

County	Percent High School Graduates or Higher (Population 25-plus Years)	Percent with Bachelor's Degree or Higher (Population 25-plus Years)
Apache	73.0	11.9
Cochise	84.5	20.4
Coconino	87.1	30.3
Gila	78.2	13.9
Graham	75.6	11.8
Greenlee	82.5	12.2
La Paz	69.3	8.7
Maricopa	82.5	25.9
Mohave	77.5	9.9
Navajo	71.2	12.3
Pima	83.4	26.7
Pinal	72.7	11.9
Santa Cruz	60.7	15.2
Yavapai	84.7	21.1
Yuma	80.4	24.4
Total Arizona	81.0	23.5
Total U.S.	80.4	24.4

Source: U.S. Census Bureau (2000)

The proportion of Arizona's population that is Latino is nearly twice the national average and is expected to continue to grow. The Latino population grew 88 percent (from 0.7 million to 1.3 million) during the 1990s and now constitutes 29 percent of Arizona's total population and more than a third of those younger than age 18. In Phoenix and Tucson, Latinos now account for half of the K-12 population, and in several metropolitan-Tucson school districts, the majority of students are Latino. However, as noted in Chapter 1 of this report, the overwhelming majority of Arizona's public school teachers are white females.



The diversity of Arizona’s students is not evenly distributed. Counties, districts, and schools in Arizona remain highly racially or ethnically concentrated. For instance, Native American students can be quite concentrated at the county level. At 6 percent of the states’ enrollments, Native American students represent 79 percent of the enrollments in Apache County and 51 percent in Navajo County. There also are instances of Latino and white concentration by county, with 95 percent Latino enrollment in Santa Cruz County and 73 percent white enrollment in Yavapai County.⁵

A look at enrollments at the district level is mixed, with some very concentrated districts and some racially diverse districts. However, some concentration at the school level is

prevalent in the more diverse districts. Pima County, for instance, has a racial population similar to the state as a whole, with 58 percent white, 33 percent Latino, and approximately 3 percent for each other racial or ethnic group.⁶ However, districts within the county are extremely concentrated. Catalina Foothills Unified District has 75 percent white enrollments and only 12 percent Latino. Sunnyside Unified School District is 88 percent Latino and only 5 percent white.⁷ On the other hand, Amphitheater Unified District in central Tucson (see Table 2.3) is an example of a diverse district with a clear pattern of racial or ethnic concentration at the school level. Enrollments in the district are similar to the county with 55 percent white, 36 percent Latino, 5 percent black, 3 percent Asian, and 2 percent Native American. However, enrollments in the district’s three high schools are not representative of district-wide demographics. Sixty percent of all Latino high school students in the district are enrolled at Amphitheater High School, while nearly 83 percent of all white students are enrolled at Canyon Del Oro or Ironwood Ridge High Schools — schools in which only 18 percent of enrollments are Latino.⁸

Table 2.3
Enrollment by Race in Amphitheater School District’s
High Schools in the 2006-07 School Year.⁹

School	Native American	Asian	Black	Hispanic	White	Total
Amphitheater	63 3.81 %	60 3.63 %	125 7.55 %	884 53.41 %	523 31.6 %	1,655
Canyon Del Oro	20 1.13 %	56 3.18 %	39 2.21%	326 18.49 %	1,322 74.99 %	1,763
Ironwood Ridge	8 0.43 %	53 2.84 %	37 1.98 %	276 14.80 %	1,491 79.95 %	1,865

The Tempe Union High School District in Maricopa County is an example of both district- and school-level concentration. The county’s 19 and under population is about 46

percent white, 32 percent Latino, and about 22 percent other races. Yet the population of residents 18 and under in the district is not quite representative of the county, with about 60 percent white, 24 percent Latino, and 16 percent other races. There is more pronounced racial concentration within the schools. Among the six schools in the district, almost one-third of all Latino students are enrolled in one school, and just three schools — McClintock, Mountain Pointe, and Tempe — enroll nearly 82 percent of all Latino students in the district. Furthermore, two schools — Corona Del Sol and Desert Vista — are more than 75 percent white. The Roosevelt Elementary School District in Phoenix is a district that illustrates the concentration between whites and nonwhites that is prevalent nationally. The district has 3 percent white enrollment, 16 percent black, and 79 percent Latino, with two elementary schools that are half black and one that is 40 percent Black.¹⁰

Achievement — K-12

Arizona's students continue to score significantly below national averages in math and reading on the NAEP (National Assessment of Educational Progress) exams. Reading scores have not significantly changed since 1992 (U.S. Department of Education, 2008).

Encouragingly, mathematics scores in grades 4 and 8 have risen steadily since 2003, with a greater percentage testing at or above basic levels.¹¹

Using the AZ Learns Achievement Profile, established by the Arizona Department of Education, schools are rated on a scale from underperforming to excelling. Maps were created to provide a geospatial visual of schools across the state with regard to this profile. As Figure 1 reveals, the most rural and remote areas of the state are more likely to have weaker-performing schools. Figures 2 and 3 provide a view of Tucson and Phoenix and display a pattern in which highly performing and excelling schools tend to be clustered together geographically, while

the lower and underperforming schools are similarly clustered. The maps show that the majority of schools are at the lower-end of the profile continuum — performing and underperforming.

Figure 2.1
Location of Schools Statewide Assessed in 2003.

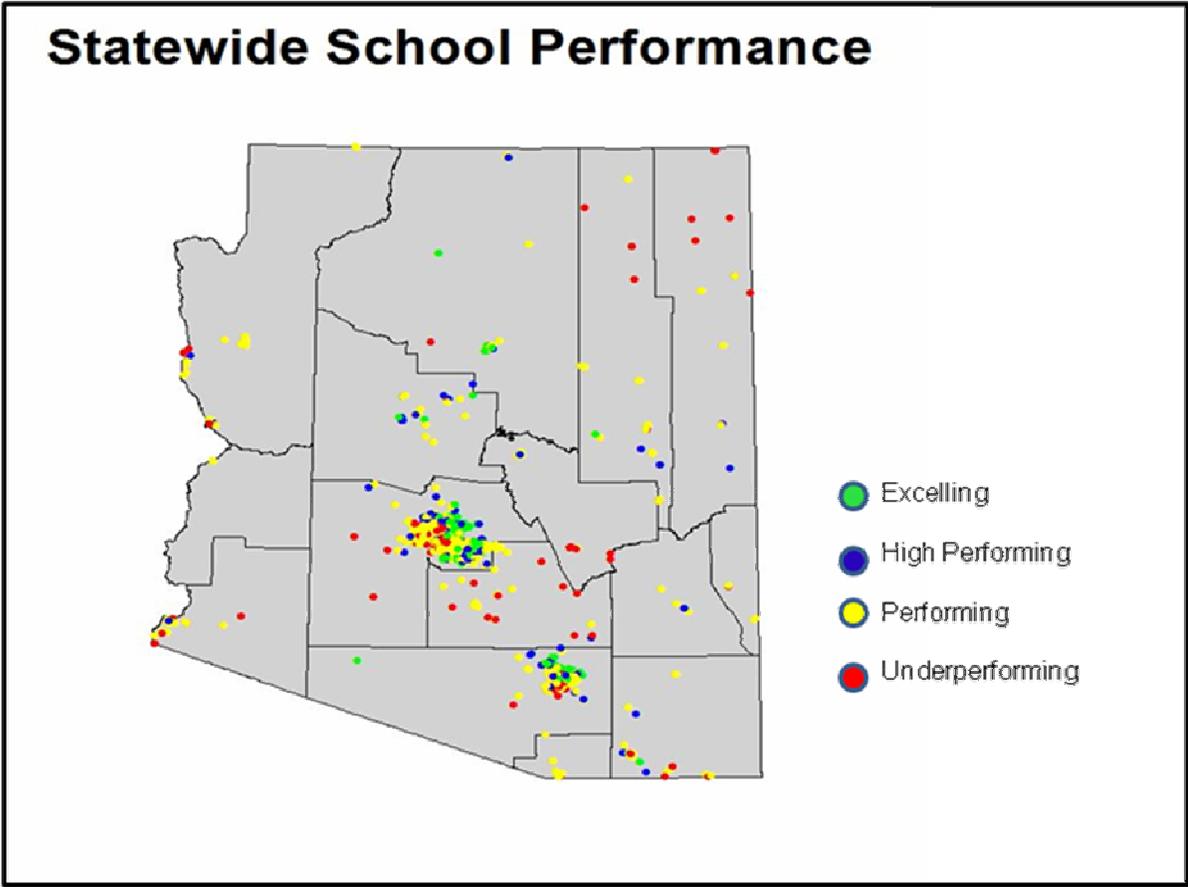
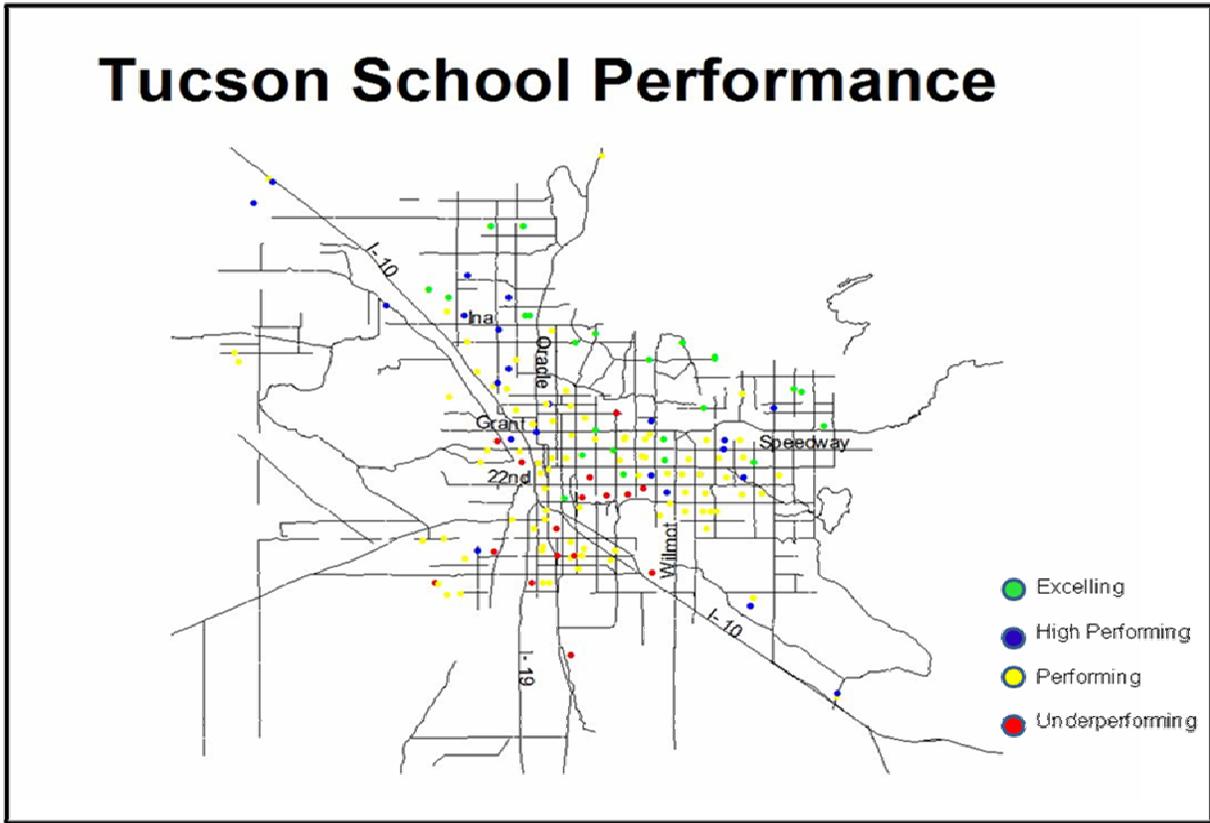


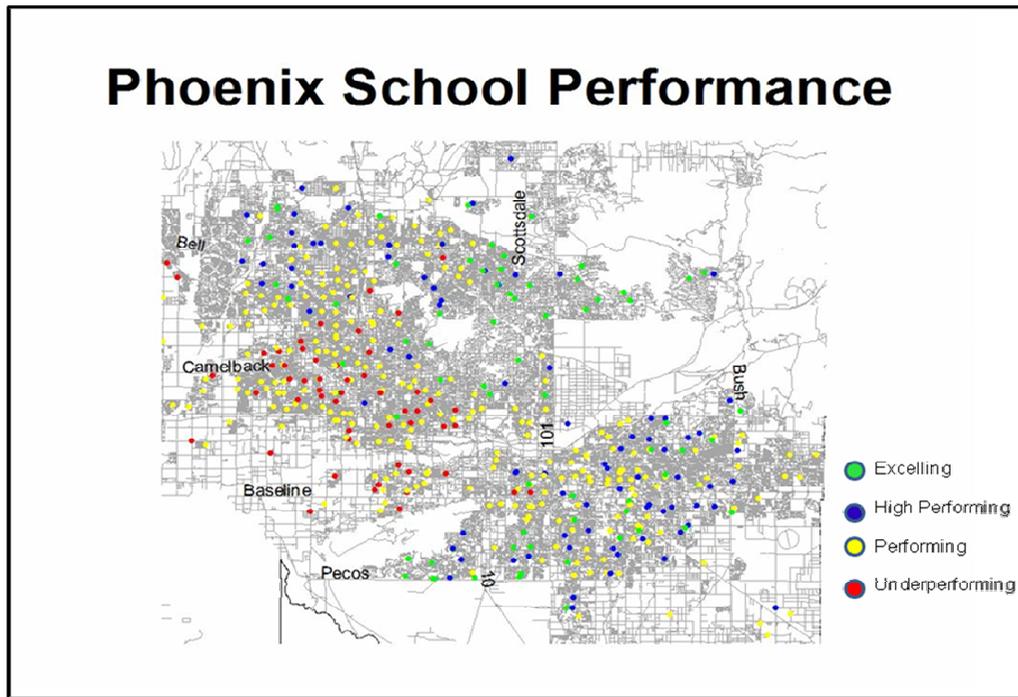
Figure 2.2
Location of Schools in Tucson Assessed in 2003.



Between 1994 and 2000, more than 200,000 Arizona children dropped out of elementary or secondary school, and alarmingly, one-third of all Arizona students and close to half of all Latino students who begin 9th grade drop out prior to completing their high school education.¹² This high school dropout problem appears to be getting worse instead of better. The National Center for Education Statistics uses aggregate data to calculate an averaged freshman graduation rate (AFGR) to provide an estimate of the percentage of public high school students who graduate on time — that is, four years after starting 9th grade — with a regular diploma. This rate is 74.3 percent nationally with a range of 57.4 percent to 87.6 percent. Arizona was among the 11 states that had the lowest rates — below 70 percent, and

although the national rate has increased over the past three years, Arizona's rate has declined by 8 percent.¹³

Figure 2.3
Location of Schools in Phoenix Assessed in 2003.



A recent report by the Education Trust finds that Latino students, African American students, and low-income students in Texas are among those most in need of strong teachers yet least likely to be taught by a certified, experienced, higher-paid, and stable (low-turnover) teaching force. The pattern in Arizona may be similar. For example, more than one-third of all secondary classrooms in Arizona are “taught by teachers lacking either a major or minor in the subject area. Classrooms in high-poverty schools and high-minority schools are far more likely

than those in low-poverty or low-minority schools to be taught by teachers out of their field of expertise.” For high-poverty schools, the rate is 44 percent.¹⁴

Furthermore, there are systematic inequalities in funding across multiple levels — federal, state, and district — that short change schools and school districts that serve low-income and minority students.¹⁵ First, the federal government distributes more funds for low-income students to the richer states and less to the poorer states. In part, the allocation of Title I money is based on the average per-pupil expenditure in that state, so higher-spending states get more money per poor student than lower-spending states. Arizona receives the very lowest Title I allocation per child, \$881. Although Louisiana, for instance, also has 2.5 percent of its children living in poverty, that state receive a Title I allocation of \$1,232 per child. Second, states tend to allocate less money per pupil to high-poverty, high-minority school districts. The gap in per-student revenues between low- and high-poverty districts and low- and high-minority districts is more than \$225 and \$230 respectively, in Arizona. With the recommended 40 percent adjustment for educating students in poverty, the gap rises to \$736 and \$680 per student respectively. This situation is quite unfortunate, particularly given the fact that high-poverty schools tend to have resources drawn away from the classrooms in order to assure a safe campus, repair buildings, etc. Third, within districts, less money is spent on schools with the most disadvantaged students. In high-poverty schools, where new teachers tend to begin and then either transfer to a higher-paid position or leave the profession, less money is spent on salaries compared to low-poverty schools in the same district. Also, districts tend to distribute more unrestricted funds to low-poverty schools that do not qualify for federally targeted programs, further exacerbating the gap in per-pupil spending at the district level.

Latino elementary and middle school students lag behind their white counterparts in reading, science, and math achievement and are severely underrepresented in Advanced Placement courses. Throughout Arizona and the Southwest, the odds are against high achievement in schools with a mostly Latino, mostly poor student enrollment. However, some schools with similar demographics have found a way to achieve consistently high results or show steady gains. These schools are featured in a report entitled, “Beat the Odds: Why Some Schools with Latino Children Beat the Odds and Others Don't.”¹⁶

The six elements of the schools that beat the odds are as follows:

- 1) A clear bottom line emphasizing the achievement of every student in every classroom with everyone at the school taking responsibility for that performance. The focus is not on achievement at the school level, but on achievement per classroom, achievement per teacher, and achievement per student, identifying and correcting poor performance in each area.
- 2) Ongoing assessment of student and teacher performance on a monthly, weekly, or even daily basis rather than at the end of the year, when it's too late to turn bad outcomes around. This information is used not only by school administrators but also by classroom teachers, helping them monitor student and teacher performance constantly and make adjustments in programs and teaching as they are needed.
- 3) A strong and steady principal who is neither too rigid nor too flexible and uses the resources at hand to do what she or he can without making excuses for their school's zip code, ambivalent parents, or their inability to replace teachers.
- 4) Collaborative solutions by effective work-teams comprised of top management, teachers, and staff who buy-in to the idea of candidly identifying problems and actively solving them.

- 5) Commitment to the program embraced by teachers and altered on a regular basis using the class and student performance data to assess students and teachers.
- 6) An educational program tailored to each student that moves beyond simply meeting state academic standards or implementing the district's improvement plan. Rather, a relentless focus on individual performance feeds a vital cycle of instruction, assessment, and intervention, followed by more instruction, assessment, and intervention to maximize student success.

Another promising initiative is “MAC-Ro,” the Math Achievement Club sponsored by the Rodel Charitable Foundation of Arizona, which has successfully raised the math achievement of elementary school students in 10 high-poverty schools in five school districts located in economically disadvantaged communities throughout Arizona. The program will expand to serve 24,000 first through fourth grade students in the 2007-08 school year. This comprehensive program reinforces long-term mastery of standards-based math along with professional development for teachers and administrators, and an important family involvement component. Evaluation of the program has shown that, in 2005-06, participating schools had more than double the increase in students meeting or exceeding standards on the AIMS test (16.8-point average point gain) compared to a control group of similar schools with a 5.9 point gain. Gains also were about double the state gains as well.¹⁷

Achievement — College Access

Despite the fact that white students in Arizona represent 46 percent of K-12 enrollments, Latinos 40 percent, Native Americans 6 percent, African Americans 5 percent, and Asian Americans 3 percent, undergraduate enrollments at Arizona's four-year colleges and universities are 65 percent white, 13 percent Latino, 10 percent Asian or Pacific Islander, 3 percent Native American and 3 percent African American.¹⁸ Clearly, white students are

overrepresented in four-year colleges and universities, particularly compared to Latinos, who are severely underrepresented. This discrepancy may be influenced by the disparities noted above.

Projections

Arizona's population, which more than tripled over the past 30 years, is expected to increase by almost 54 percent between 2003 and 2020, from approximately 5.6 million residents in 2003 to approximately 8.6 million residents by 2020. One-and-a-half million of these residents are younger than age 18 and comprise more than one-quarter of the total population. This younger than age 18 segment is expected to increase to 2.1 million by 2020.¹⁹ It is important to recognize that half of all persons younger than age 18 in Arizona are not white.²⁰ These population increases will present an increased demand for access to quality K-12 and postsecondary education and expected huge increases in educational enrollment at all levels.²¹ Arizona's demographic characteristics signal a challenge of major proportions, given the state's current inequalities in achievement and attainment.

Kindergarten-12th Grade

While national projections predict enrollment in public elementary and secondary schools to increase by 9 percent from 2004 to 2016, enrollment in Arizona is expected to experience an increase by more than three times that rate — 28 percent.²² As one might expect, this will result in a tremendous increase in the number of high school graduates in Arizona as well. While there will be an expected 6 percent national increase in public high school graduates between 2004 and 2016, Arizona is projected to experience the third-largest percentage increase in high school graduates — 43 percent, despite the fact that its completion rate is dropping. Overall, at the elementary and secondary levels, only Nevada and Utah are

expected to experience higher percentage increases in enrollment and high school graduation. The Western Interstate Commission on Higher Education projects that minority groups, which account for about 40 percent of all public high school graduates in Arizona, are expected to rise to 54 percent by 2014, with 41 percent being Latino. By 2013-14, Latinos are projected to represent more than 40 percent of all public high school graduates.²³ As achievement gaps persist, so will demands on teachers.

Postsecondary

Despite the rapid projected growth of the K-12 population, the pool of college-ready students in Arizona has dropped, and K-12 teachers need to collaborate to ensure enough students are prepared for college. Postsecondary enrollments are expected to increase by 17 percent across the nation. However, these national projections, when broken down by race or ethnicity, reveal the highest-expected increase to be among Latino enrollments. Nationally, while white postsecondary enrollments are only expected to increase by 8 percent, Latino enrollments are expected to increase by 45 percent. Therefore, Arizona should expect a higher-than-average increase in enrollments, which, when coupled with efforts to support students through to bachelor's degree completion, may boost the state's share of bachelor's-degree holders. As Table 2.4 illustrates, in the 10 years between 1993 and 2003, Arizona's public universities granted 170,157 bachelor's degrees, 59,374 master's degrees, 8,269 Ph.D.'s, and 5,247 professional degrees.

Yet in the next 10 years, Arizona's economy will require more than 330,000 bachelor's, 74,000 master's, 16,000 Ph.D.'s, and 23,000 professional degrees. In addition, the educational level (nationally) of those with at least a bachelor's degree is rising nearly twice as rapidly as Arizona's increase. In 2000, 22.9 percent of Arizona's population ages 25-34 years

had at least a bachelor’s degree. With current population projections, to remain at that level would require that 269,000 people earn bachelor’s degrees by 2020.²⁴ To approach the current national average for college graduates (27.5 percent) by 2020, more than 323,000 people age 25-34 will need to hold bachelor’s degrees. Arizona must take the necessary steps to make some significant changes to its higher education system in order to accommodate this demand and keep pace with both its own economy and the growth in bachelor’s degrees nationally.

Table 2.4
Arizona Degree Production and Projected Needs

Degree	Number of grads in Arizona (1993 - 2003)	Projected grads required by Arizona economy by 2015
Bachelor’s	170,157	330,000
Master’s	59,374	74,000
Ph.D.	8,269	16,000
Professional	5,247	23,000

Source: Arizona Board of Regents (2005)

The 21st Century Student

“The concept of funds of knowledge is based on a simple premise: all individuals are competent and capable of learning.”²⁵

English-Language Learners

According to the U.S. Census Bureau, almost 26 percent of all children age 5 years and older in Arizona reported that they speak a language other than English at home, compared to 18 percent for the entire nation.²⁶ Moreover, it is estimated that 16 percent of all students enrolled in Arizona’s primary and secondary schools were classified as English-language

learners (ELLs) in 2003.²⁷ Teaching “language-minority” children is a complicated task and the controversial subject of heated political and emotional debate.

Research findings suggest students with strong native-language proficiency are more likely to develop greater English proficiency, and native-language instruction bolsters English-language learners’ academic success in other core areas. Native-language use is one effective component among many that educators should have the autonomy to utilize in order to promote academic success for ELL students. Furthermore, there are program components, or features, that are similar across effective programs designed for ELL students. These components include some native-language instruction initially, a relatively early phasing in of English instruction, and teachers specially trained in instructing English-language-learners.²⁸ In his meta-analysis, Greene found that limited English proficient (LEP) students who are taught using at least some of their native language perform significantly better on standardized tests (of all tests in English, and tests in English reading) than similar students taught only in English. Moreover, studies of bilingual programs with random assignment, which is the most rigorous research design, have even stronger results. Research concludes that at least some of the achievement gap between minority and white students on standardized tests nationwide can be closed with the benefit of using at least some native language in instruction (about 20 percent of the one standard deviation).²⁹

Nevertheless, a new state law requires that, beginning in fall 2008, English-language learners will be required to be pulled out for English-language instruction for four hours each school day. The history of rapidly changing policies and continuing battles over appropriate funding levels has left school districts to figure out last-minute strategies for the hiring of additional teachers along with the need for extra textbooks and space for such instruction.

Further questions remain. At the high school level, will such practices hinder students' ability to complete courses necessary for college readiness? Will continuing unsettled debates regarding instructional requirements hamper teachers' ability to facilitate learning in the first year of implementation?

Native American Students

American Indians are a prominent part of the history of this geographic region and contribute to the rich cultural diversity of Arizona, which ranks third nationally in total American Indian population and is home to 22 American Indian Tribes, Nations, and Communities and 21 federally-recognized Indian reservations. More than 250,000 American Indians in Arizona constitute 5 percent of the state's population.³⁰ Reservations and tribal communities comprise more than one-quarter of Arizona's lands. The teaching of American Indians continues to present challenges, and teacher education and development efforts may be best considered within the cultural context of the American Indian communities.

American Indian college enrollment more than doubled, from 76,100 in 1976 to almost 166,000 in 2002.³¹ However, American Indians continue to have lower educational attainment rates than people from other racial or ethnic backgrounds. Almost 28 percent of American Indians age 25 and older in 2004 had not graduated from high school, compared with the national average of 15 percent.³² Further, in 2003, American Indians between the ages of 18 and 24 were less likely to be enrolled in a college or university than their white, Asian or Pacific Islander, and black peers. Only 18 percent of American Indian 18- to 24-year-olds were enrolled in a college or university, compared with 42 percent of whites, 60 percent of Asians, 32 percent of African Americans, and 24 percent of Latino students.³³

African American Students

Although African Americans are a small minority of the population in Arizona, their numbers have grown by 43 percent between 1990 and 2000 (Anderson, 2003), and they continue to be an educationally underserved community. The majority of African Americans in Arizona reside in Maricopa County in the cities of Phoenix, Avondale, and Glendale. Interestingly, African Americans constitute a relatively high proportion of Cochise County's Sierra Vista population (11 percent) as well.³⁴ Nevertheless, more than three-quarters of all African-American K-12 enrollments are in Maricopa County.³⁵

As a measure of some success, Arizona was the state with the greatest gains in NAEP Grade 8 mathematics scores among African American students from 2000 to 2005, bridging about half of the 40-point gap between whites and blacks on this measure. However, African Americans continue to underachieve in reading, and they are overrepresented among high school dropouts and underrepresented in AP courses.³⁶

Culture and Family

Research with ethnically and linguistically diverse students strongly suggests that recognizing students', families', and communities' resources and knowledge is essential for students' success in school and in life. Moll, González, Neff, and Amanti conducted one of the most influential investigations that adopts this perspective.³⁷ These authors studied working-class families' funds of knowledge in Arizona. (One of the easiest ways to understand what funds of knowledge means is to think about the multiple funds that families must, simultaneously, acquire, dispose of, and manage to maintain the household and individual well-being of family members: social funds [i.e., kinship and friendship], caloric funds [i.e., nutrition], and funds of rent [i.e., housing].) The investigators found that the knowledge and

skills that these families (and their networks) possess are extensive and, most importantly, that these multiple resources positively influence children's learning. In other words, the families' knowledge was broad and diverse. It included information associated with the families' rural origins, or knowledge about construction and building, as well as knowledge about many other matters such as trade, business, and finance on both sides of the border between Mexico and the United States. Given these findings, the authors suggest that teachers can recognize and use students' and families' funds of knowledge. For example, teachers can learn about their students' funds of knowledge and incorporate them into the curriculum used to teach students. As the authors suggest, doing this helps us view children, families, and communities not as places from which children need to be saved or rescued, but rather, as places that, despite some challenges, contain valuable knowledge and experiences that can foster children's development.

At a time when national debates emphasize accountability through testing, González, Moll, and Amanti³⁸ offer recommendations to teachers and school administrators to help all of their students succeed in school and in life. The main components include the following:

1. Instruction linked to students' lives.
2. Effective pedagogy linked to local histories and community contexts.
3. Teachers who venture into their students' households and communities, not only as teachers attempting to convey educational information, but also as learners trying to understand how people make sense of their everyday lives.
4. Teachers who meet in study groups to discuss their experiences in learning from their students' households and communities, and to develop innovations in teaching.
5. Teachers who make use of the information learned about their students' households and communities to improve their teaching practices.

Generational Differences (e.g., technological expertise and use)

Research on the transfer of learning strongly supports the position that instruction and educational activities should closely parallel the final desired behavior.³⁹ It is important that technology instruction be an integral part of a student's educational experience. Education's role is to help students meet the challenge of the future. Thus, Arizona must encourage, assist, and provide all students with the required tools and instruction to enable them to acquire knowledge, develop skills, and apply these tools successfully in our world.

The technological expertise of high-poverty populations will play a large role in characterizing the technological competence of Arizona's schoolchildren and workforce. While only 8 percent of white Arizonans live below the poverty level, more than one-quarter of Latino Arizonans live in poverty. Data on the Latino population is available with regard to science-related fields. Among Latinos that graduated from college, few have chosen science, technology, and engineering fields — obtaining only 9 percent of the state's STE bachelor's degrees in 2000.⁴⁰ Given the critical role that technology plays in our society, the Arizona Department of Education has taken a proactive role and approved a Technology Plan for Arizona. One of the most important goals of this plan is to ensure all K-12 resources are available for all students (regardless of race, ethnicity, income, geography, or disability) to become technologically literate by the end of 8th grade. The Arizona Department of Education is asking local educational agencies to submit proposals that contribute to enhancing the education of students through technology (see <http://www.ade.az.gov/technology/>).

Thus far, much work has been done to close the gap in technology access by wiring and installing equipment in the public schools that were without it, paid for mainly through Students First program funds. However, the teachers' role in the use of this technology is

crucial, and in order for technology to have an impact on student learning, investment must be made in teacher training and understanding of how to integrate technology to support student skill development.

“Technology Counts 2004,” a report by *Education Week* magazine, reveals that in Arizona, the state average ratio of students per instructional computer is 4.5:1 and 3.6:1 in schools with a high percentage of minority students. “Technology Counts 2004” also reports that 89 percent of Arizona schools have Internet access for one or more computer classrooms, but only 68 percent of teachers used the Internet for instruction. Many teachers do not feel well-prepared in the use of computers and software, and a majority feel unprepared to use software for instructional purposes.⁴¹ This is unfortunate, given that existing research suggests that a teacher’s proficiency in the use of technology substantially influences at least two important uses of technology in the classroom: how (and how much) technology is used by the students. Since teachers are the architects of students’ learning experiences during the school day, they affect not only what students learn but also how they learn it, with what tools, and in which learning environments. When teachers are prepared to use technology to facilitate students’ construction of knowledge through inquiry-based projects, technology becomes a tool of empowerment that gives students access to more resources and more time to spend on problem solving, thinking, and reflection. Given that the classroom may present a substantial opportunity for poorer students who do not have computer access at home to use the technology, integrating its use into classrooms is crucial. For example, nationally, one-third of Latino families and less than one-third of families with incomes below \$25,000 use computers at home. However, these rates double when adjusted for computer use at school and work.⁴²

Students' Expectations

“Today’s teenagers are both highly ambitious and increasingly unrealistic.”
(John Reynolds et al., Florida State University)

Although the goal of P-12 education is not simply one of preparing students for college, all students who progress through their senior year in high school should be at least minimally prepared for college-level work. There is no doubt that college aspirations have increased dramatically. High school students of all races and income levels have higher educational aspirations than ever before.⁴³ More than 85 percent of high school graduates say that they plan to pursue college degrees, and all but 10 percent of them enroll in postsecondary education.⁴⁴ Continuing one’s education into a postsecondary setting has been described as a “norm of expectations among high school-graduates.”⁴⁵ Berkner and Chavez contend we have reached a 75-percent college-access rate.⁴⁶

However, this scenario of high hopes can be deceptive in several ways. First, it reflects the aspirations of high school seniors and graduates, excluding those students who have dropped out of high school. Given the soaring high school dropout rates that plague Arizona, these percentages do not accurately reflect the aspirations of all students who begin high school. Instead, they reflect the expectations of those who have made it to graduation. Unfortunately, in particular subpopulations, the high school dropout rate is extremely high. Among those living in American Indian Areas (AIAs) in 2000, one-third of the population 25 years and older had not graduated from high school, and only 35 percent had attended college.⁴⁷

Second, these high expectations translate into only limited success for low-income, lower-achieving, and first-generation college students, most of whom will fail to obtain college degrees. This is particularly problematic at community colleges and especially relevant

for black and Latino students for whom more than half drop out of college.⁴⁸ Adelman⁴⁹ and Rosenbaum⁵⁰ remind us that high educational goals are prevalent, but not sufficient for obtaining a bachelor's degree, particularly for high school students who are lower-achieving, less academically prepared, or not exposed to a rigorous high school curriculum.

Arizona's solid Education to Careers (ETC) program has outlined multiple pathways to careers that do not necessarily require a bachelor's degree. The state might consider thinking creatively to expand ETC to inform more students of career options across the spectrum of secondary and postsecondary education, including exposure to the ladder of jobs that exist within any particular field. Such exposure can inform students of which positions in a given occupational field require a high school diploma, which require a subbaccalaureate degree, and which require an advanced degree. Such a broadened approach may lessen the opaqueness surrounding career options, particularly for students at risk.

Third, high expectations are certainly necessary in order for students to pursue and achieve high postsecondary goals. However such high expectations can be problematic for students whose goals may be uninformed and unrealistic because it can result in inflated ambitions rather than realistic plans. The increase in uninformed plans is likely a result of the scarcity of individualized college counseling, particularly for average students and lower-achieving students, and college counseling is a service that has not expanded as rapidly as college aspirations have increased. Reynolds et al. analyzed 25 years of high school senior classes to conclude that "today's teenagers are both highly ambitious and increasingly unrealistic."⁵¹ Their plans for schooling and work have become dramatically more ambitious, yet they are more likely to plan to use a two-year degree as an educational stepping-stone between high school and more advanced degrees, a pathway with very low odds of success.

Also, seniors' expectations are out of alignment with the achievements of recent high school graduates, and the gap between students' plans and what is probable has grown since the mid-1970s. Students also are unrealistic in that they are relying less on their high school grades and curriculum completed in determining their career plans than they did in the past. These inflated ambitions undermine the positive effect of high goals on college and career outcomes that researchers have traditionally found:

... the link between the educational plans of high school seniors and what they achieve in the following six years has become weaker since the 1970s. Thus, not only are high school seniors more unrealistic today than in the recent past, but they will also experience greater disappointments on average in terms of realizing their achievement plans. Seeing others fail to achieve their expectations could lead to motivational problems for future classes of high school students...⁵²

Bohon, Macpherson, and Atilas observed this dynamic in their study of Latino immigrants.⁵³ The State of Arizona needs to focus not just on encouraging students to enroll in college, but on preparing students to succeed in college once they enroll. Otherwise, students' frequent failure to obtain college degrees could have serious social consequences within particular communities. In a state in which high school curriculum rigor is not well aligned with college admissions standards, such a situation is not unlikely. As noted above, an emphasis on career pathways and college preparation need not be mutually exclusive areas of focus.

A User Perspective on Graduates

Community College and University Experiences

“Despite improvement, Arizona continues to struggle in preparing students to succeed in college. This year Arizona receives a D in preparation.” (The National Center for Public Policy and Higher Education “Measuring Up 2006” Arizona state report card)

Community colleges now are a dominant aspect of our postsecondary education system. Three-quarters of all public postsecondary institutions in Arizona are community colleges, which enroll 63 percent of all public undergraduates in Arizona. It has been well documented that the majority of expansion of access to higher education has occurred via community college particularly for first-generation college students and underrepresented minorities. Nationally, while enrollment in four-year colleges has doubled since 1965, enrollment in community colleges has increased five-fold.⁵¹ Minority students are more likely to attend two-year colleges, with Latinos composing 22 percent of the community college population compared to their 13 percent share of the four-year college population.

Simply measuring rates of enrollment can be deceptive if one does not consider that the vast majority of students who begin at a community college do not complete degrees. College enrollment and college completion should not be equated. Clearly, there exists a very wide gap between enrollment and degree completion. In fact, more than one-quarter of college freshman at four-year institutions do not return for their sophomore year, and half of the freshman in two-year colleges do not return.⁵⁵

Many high school students are not developing the academic proficiency to sustain them through college to degree completion. Exposure to a rigorous high school curriculum — including higher levels of math and two years of lab science — is one of the most important

factors in a student's likelihood of completing a bachelor's degree.⁵⁶ It is important to align Arizona's high school graduation requirements with admission requirements at four-year colleges and universities so that graduates who want to continue their education can do so. The lack of alignment adversely affects students' chances of gaining admission, increases the likelihood that they will be required to take remedial coursework, and decreases the likelihood that they will obtain a bachelor's degree.

The minimum requirements for graduating from high school do not qualify Arizona students for admission to its state universities. Fewer than half of Arizona high school graduates are eligible for direct admission from high school into the state universities due to the fact that so many students fail to take all of the required courses for admission.⁵⁷ This may occur mainly as a result of the minimum high school graduation requirements, which are not well-aligned with college admission requirements. High schools need to support a culture of high expectations that raises or reinforces the college aspirations of students' families by translating these aspirations into concrete expectations that students will take the necessary rigorous coursework to be prepared to succeed in college. The pathway to rigorous work is solidified in middle school, which underlines the favorability of having middle school teachers with secondary certification, particularly in algebra, which is known to be a gatekeeper for college success.

As a result of under-preparation, thousands of Arizona community college freshmen take remedial (below college-level) math and English courses each year. During the 2005-06 academic year, more than 27 percent of first-time college freshmen were enrolled in community college remedial math courses and more than 18 percent were enrolled in prefreshman English.⁵⁸ The Arizona State Board of Education recently proposed an increase in

high school graduation requirements, including phasing in a requirement for four years of math and three years of science. This is a policy that promotes the same agenda as the Arizona Academic Scholars initiative, which has been adopted by nine school districts throughout the state. As Table 2.5 reveals, the Arizona Academic Scholars Program, in contrast to high school graduation requirements, provides for a higher level of rigor in multiple course areas which better prepares students for admission and success in Arizona’s universities.

Table 2.5

Requirements for Arizona Academic Scholars Program relative to high school graduation requirements and university admissions.

Course	High School	Arizona University System	Scholar’s Program
English	Four credits (one-half credit of speech and debate allowed)	Four credits (only literature and composition)	Four credits (English 1 through 4)
Math	Two credits	Four credits (through advanced math)	Three credits (algebra 1, geometry, algebra 2)
Science	Two credits	Three credits lab science (one unit each in three of four areas: biology, chemistry, physics, earth science)	Three credits (lab science in biology, chemistry, physics)
Social Studies	Two and one-half credits (U.S. and Arizona government, world history/ geography)	Two credits	Three credits (geography, world history, U.S. history, U.S. government / civics and economics)
Language other than English	None	Two credits	Two credits (same language)

Source: <http://www.azacademicscholars.org/study.cfm>

Although college aspirations and expectations vary only slightly between racial or ethnic groups, the college goals of lower-income families of all ethnic backgrounds are much lower. As a result, teachers in high-poverty schools face the additional challenge of informing

students and their families of the benefits of college and particular career paths. Teachers can act as institutional agents to facilitate students' college knowledge, preparation, and planning.⁵⁹ Generally, families are responsive to such efforts, but a lack of college knowledge prevents effective strategizing for college.⁶⁰ Introducing the prevalence of lifelong learning also may bolster a perspective on college-going as normative.

The Business Community

“The future workforce is here, and it is ill-prepared.”
(The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management).

A national study of human resource officials examined employers' views on the readiness of recently hired graduates from high schools, two-year colleges or technical schools, and four-year colleges to enter the U.S. workforce.⁵¹ With regard to information technology, teamwork, and diversity, the workforce readiness of high school graduates was considered adequate. However, the remainder of the report illuminates serious concerns, concluding, “The future workforce is here, and it is ill-prepared.”

Business leaders were most frustrated with secondary and postsecondary entrants' lack of applied skills, such as teamwork, critical thinking and problem solving, communication, and professionalism and work ethic defined as personal accountability, punctuality, ability to work productively with others, and time and workload management. For instance, nearly three-quarters of the survey respondents rated recently hired high school graduates as deficient in critical thinking and problem solving, which was defined as the ability to exercise sound reasoning and analytical thinking; to use knowledge, facts, and data to solve workplace problems; and to apply math and science concepts. Given the heavy emphasis on passing

AIMS standards, test preparation can sometimes narrow the curriculum to the extent that it can interfere with teachers' ability to teach such critical-thinking skills.

In addition, 40 percent of employers surveyed found high school graduates lacking in basic skills in reading comprehension, writing, and math. Writing was of particular concern, with more than 80 percent reporting their high school graduate hires were deficient in written communications (memos, letters, and complex technical reports). Nearly three-quarters of incoming high school graduates and nearly half of two-year college graduates are viewed as deficient in basic English writing skills, including grammar and spelling.

In our knowledge-based economy, credentials are becoming increasingly important. Nationally, 80 percent of the top 50 fastest-growing jobs will require education beyond high school, and 40 percent of all new jobs will require at least an associate's degree.⁵² Given educational inequities, this will adversely affect the state's economic competitiveness. In the U.S., shifting patterns of economic organization have led to a decline in the number of manufacturing and other lower-skill-level jobs and an increase in the number of jobs that require technical skills and higher education. Furthermore, there is increased competition for high-skill-level jobs among rapidly developing countries such as China and India. This has led the U.S. Department of Education to conclude, "Given the changing demographics of the nation's workforce over the next two decades, the current educational disparities among racial or ethnic groups are projected to lead to a decline in the educational level of the U.S. workforce as a whole. This drop in the levels of education completed would in turn result in a decrease in personal income per capita among Americans."⁵³

The fact that Latinos are the largest- and fastest-growing minority group in Arizona and are attending college at such relatively low rates could have a dramatic impact on the

overall educational level of the state's workforce. The average age of whites in Arizona is 38, and more and more of the college-educated white population in Arizona will reach the age of retirement in the next decade. The average age of Latinos in Arizona is 24, and they are expected to represent a much larger proportion of the workforce in future decades. Arizona increasingly will need to rely on the Latino community for its workforce needs.⁵⁴ If Latinos continue to be more likely to go directly to work from high school rather than pursue postsecondary education, the average educational level of the workforce will decline.

Over the past decade Arizona's economy has been robust. However, educational inequality may erode growth in jobs and wages in the state. "Consensus among leaders in many sectors is strong that Arizona's economic future lies not in growth-related employment, but in the high-skill jobs and income that comes from innovation and invention."⁵⁵ Between 1990 and 2003 Arizona ranked 2nd among states in the nation in terms of job growth. However, many of these jobs yielded relatively low wages and per capita income in Arizona is ranked 37th in the nation. Arizona is in the middle of the pack among U.S. states in terms of high-skill jobs and has the potential to grow in this area but currently lags in in-state educational production:

Besides agreement on the primacy of the knowledge economy, economists, elected officials, and business leaders seem to agree on workforce development as a key emerging issue. Arizona essentially has "imported" its skilled labor force in recent decades. However, with the increased demand for skills, no state can depend on migrants. That has put a premium on improving Arizona's K-12 system, enhancing its university system, and streamlining its public workforce development programs.⁵⁶

The impact of educational inequity may already be evident in Arizona. The "disappearance of low-skill jobs," "concerns about shortfalls in education and skills," and

“projected labor shortages” are among the most important issues facing workforce development in Arizona today.⁵⁷ As the state transitions into an economy based on high-skilled employment, and the state’s population becomes more diverse, it is necessary to close the educational gap between whites and other groups in order to maintain wage and job growth and ensure the prosperity of the state.

Given the converging trends in Arizona’s population, workforce and education, policies that improve Latino educational attainment in Arizona also enhance the state’s human capital and the skills required of a competitive workforce. As the landmark report, “Five Shoes Waiting to Drop on Arizona’s Future,” published by the Morrison Institute for Public Policy reveals, successfully turning around the low achievement and high dropout in the education of Latinos will be vital to Arizona’s ability to make a successful transition to the 21st century economy. The Arizona Business and Education Coalition is in agreement with the State Board of Education and the Governor’s P-20 Council in advocating that high- school students take four years of math and at least three years of science before graduating in order to prepare them for postsecondary studies and 21st century jobs.

In addition to what has been discussed above, most educators realize that the repercussions for teachers of inadequacies in early childhood education continue along the entire P-16 educational pipeline. For instance, underachievement in literacy and math skills pressures teachers to teach to the test and prevents them from focusing on more challenging or engaging curricula. Therefore, the process of educational improvement must begin much earlier — at younger ages. Arizona has the opportunity to invest in this effort through the First Things First Initiative, which will use a tax on cigarettes and other tobacco products to finance programs that would benefit early childhood development and increase a child’s probability of

success once they enter school. Most scholars agree with the idea of addressing learning opportunities early in life to impact long-term educational success down the road:

It would be far better if we turned our reformist energies toward improving educational opportunity earlier in life. Research ... makes clear that young people's academic fates are decisively shaped by the amounts and kinds of resources available to them in their earliest years. A national preschool program, generously supported by the federal government, would take us a long way toward equity in selective college admissions. So too would national support for adequate college guidance at high schools in low-income areas and for the "extra" curriculars, like music, art, and varsity sports, that make meritocracy more varied and fun for kids in wealthier school districts.⁵⁸

Perhaps Arizona can continue to invest in such efforts, addressing issues of quality and inequity among younger children. Such a focus could direct resources to those teachers who will be fundamental to providing the academic foundation and guidance necessary for more of Arizona's students to transition successfully into primary grades, middle grades, then through high school, where they can move on with the option of ultimately being successful in their job and career trajectories or in college with success in degree completion and improved job prospects.

Chapter 3

Ensuring Teaching Quantity and Quality: State and Federal Policy for Teaching

Penny Kotterman

This chapter reviews a wide range of topics and policy issues that are considered to have an effect on the quality of teaching. More than a decade ago, the National Commission on Teaching and America's Future issued a report, "What Matters Most: Teaching for America's Future" (1996), calling for all children to be taught by a "competent, caring, qualified teacher in schools organized for success." Now, 12 years later, national experts, citizens, and politicians alike agree that quality teaching is the most essential ingredient to student success, but we remain at odds over the means to achieve this goal. In order to promote informed debate and seek cooperative solutions, this chapter addresses policy and practice in the key areas of teacher certification, teacher preparation, support for new teachers, professional development, teacher standards and assessments, and teacher evaluation. It reviews such sensitive issues as teacher salary and incentives, resource allocation of talented teachers, the structure of the teaching day and year, and the data-collection systems necessary to make large-scale policy decisions related to these issues. The chapter ends with four case studies of programs that only touch the surface of best practices in some of these areas.

Paths to Certification

Teaching is among the newest of the regulated professions. Unlike many other licensed professions such as the medical, legal, accounting, and engineering professions, it was only in the 1930s with the advent of the National Teacher's Exam (NTE) and the 1950s with the

establishment of the National Council for Accreditation of Teacher Education (NCATE) that any real standardization of the preparation and licensure of teachers took place in this country.¹

Licensure and certification often are used interchangeably in the education profession. Obtaining a license or certification is proof that the individual has completed the training and passed the necessary and required exams to work in the profession. In most professions one receives a license to practice, which indicates one meets entry-level standards and requirements set by the licensing body, and then one obtains certifications in specialty areas.

Teacher certification in Arizona primarily is under the jurisdiction of the State Board of Education but both federal and state legislation impact the formation of state board rules and regulations that govern the application, award, and revocation of certificates. The Arizona Department of Education, under the direction of the state board and the Superintendent of Public Instruction, is charged with creating and implementing these rules and regulations. Arizona's teacher and administrator system is based on the Arizona Professional Teacher standards and the Arizona Professional Administrator Standards. All preparation programs, alternative routes, and teacher assessments must be aligned with these standards.

Types of Certification and Elementary Certification

In Arizona teachers must have a substitute, emergency, intern, standard, or provisional certificate to teach in any public school district. Teachers in public charter schools are exempt from this requirement by statute and are subject to the hiring requirements of their charter school. Private school teachers in Arizona are not subject to any certification or reporting requirements.

Teachers obtain a provisional or standard certificate in early childhood (birth through age 8), elementary K-8, secondary subjects 7-12, special education K-12, and career and

technical education K-12.² A provisional elementary K-8 certificate is valid for two years and is not renewable, although it may be extended once for two years. Requirements for the elementary provisional certificate are a bachelor's or more advanced degree from an accredited institution, a passing score on the Arizona Educator Proficiency Assessment (AEPA) professional knowledge and subject-matter knowledge tests pertaining to elementary K-8 teaching practice, and one of the following three options:

- a) Completion of a teacher-preparation program in elementary education from an accredited institution or a board-approved teacher preparation program.
- b) A valid elementary education certificate from another state; or
- c) Forty-five (45) semester hours of elementary education courses from an accredited institution to include prescribed areas of study and a minimum of eight semester hours of practicum.

The standard elementary teaching certificate is valid for six years and requires that an individual meet all of the requirements for a provisional certificate, forty-five (45) clock hours or three semester hours of instruction in research-based systematic phonics instruction from an accredited institution or other provider, and a passing grade on the performance portion of the AEPA. Arizona has required a performance assessment as a part of its certification process since 1998, but since the State Board of Education has not adopted an assessment instrument, this requirement is waived.

Endorsements on Existing Certificates

Teachers also can earn endorsements to specialize in certain areas. Some of the endorsements are required for holding certain teaching positions and others are optional. Districts may require endorsements that the state does not require as a part of their hiring practices.

Optional endorsements are offered in math (K-8), elementary foreign language (K-8), library and media (K-12), middle-grade instruction (5-9), special-area instruction in the arts, technology and physical education (K-12), and driver education. The early childhood education (birth–age 8) endorsement is not required, but is recommended for all K-3 teachers. Endorsements in reading (K-12), gifted education (K-12), cooperative education (K-12), bilingual education (K-12), and English as a second language (ESL, K-12) are required for individuals teaching in these specific program and instructional areas. In addition, an ESL, bilingual, or structured English immersion (SEI) endorsement is required for all certified teachers, supervisors, principals, and superintendents. Each of these three endorsements is summarized below.

The SEI endorsement requires up to 60 clock hours of instruction for educators in “Structured English Immersion methods of teaching English-language learner (ELL) students.”³ This is a specific structure and set of strategies for teaching students who speak a language other than English and was mandated by the passage of Proposition 203 in 2000. Proposition 203 uses the terms “sheltered English immersion” and “structured English immersion” interchangeably according to the following specific definition:

“Sheltered English immersion or structured English immersion means an English-language acquisition process for young children in which nearly all classroom instruction is in English but with the curriculum and presentation designed for children who are learning the language. Books and instructional materials are in English and all reading, writing, and subject matter are taught in English. Although teachers may use a minimal amount of the child’s native language when necessary, no subject matter shall be taught in any language other than English, and children in this program learn to read and write solely in English. This educational methodology represents the standard definition of sheltered English or structured English found in educational literature.”

The SEI endorsement was required by the legislature after the passage of Proposition 203 and a specific curricular framework was adopted by the State Board of Education to address the specific skills and knowledge necessary to implement a structured English immersion model throughout Arizona's public schools. The curricular framework includes four to six objectives in the areas of English-language learner (ELL) proficiency standards, data analysis and assessment techniques, SEI foundations and learning experiences and parent, home, and school culture; language, and communication. Teachers who hold an ESL endorsement or a bilingual endorsement are not required to take separate coursework to meet the requirements of the SEI endorsement.

The ESL endorsement requires six to eight three-credit-hour courses (90-120 clock hours) and is a set of coursework in the areas of language development, methodologies for teaching English-language learners, a practicum teaching in an ESL setting, and documented second-language learning experience. The Bilingual education endorsement requires six to eight three-credit-courses (90-120 clock hours) and includes foundations and methodologies for teaching non-English-language students, bilingual methodologies, ESL methods in bilingual settings, specific coursework in curriculum development, writing, reading, and assessment for bilingual and ESL students, a practicum teaching in a bilingual classroom, and demonstrated language proficiency in a language other than English. Both of these endorsements require coursework in working with school, community and family culture, and parental involvement. They are an in-depth development of skills and knowledge related to teaching students who are English-language learners (ELL) and explore multiple strategies and structures for teaching children content and language proficiency, including, but not limited to, partial- and full- immersion programs and bilingual education.

Substitute Certificates

An individual with a bachelor's degree and a fingerprint clearance card may obtain a substitute certificate valid for six years and may teach no more than 120 days in the same school each school year. These individuals may be temporarily assigned to contract teaching positions. An emergency substitute certificate requires a high school diploma, is valid for only one year, is limited to only 120 days per year in any school classroom and may be reissued upon verification of two semester hours of coursework or the equivalent of district in-service or professional development. These individuals may not be assigned temporarily to contract teaching positions. The school superintendent must verify that an emergency exists for which they are unable to find a regular substitute or certified teacher.

Emergency Certificates and Intern Certificates (Alternative Routes)

Emergency certificates are valid for one year or a portion of one year, and entitle the individual to enter into a teaching contract. Emergency certificates also require a superintendent to verify that an emergency exists and can only be issued for elementary, secondary, and special education certificates or required endorsements. The applicant must have a bachelor's degree and fingerprint clearance. Certificates are renewable with the completion of six hours of coursework toward the certificate or endorsement area for which the applicant is applying. Certificates often are used by individuals who come from out of state and have deficiencies in meeting Arizona's provisional or standard certification requirements. These individuals are entering the profession and have enrolled in a nontraditional teacher-preparation program part time. There are nearly 300 Teach for America teachers in the Phoenix area teaching with emergency certificates and mostly enrolled in programs at ASU

and Rio Salado. They will complete their teaching credentials during their first two-year commitment to teaching.

The intern certificate is another way which individuals who are not prepared in traditional undergraduate or graduate degree programs can earn a teaching certificate while working as a teacher or a paraprofessional. The State Board of Education, pursuant to statute, established this certificate for the express purposes of identifying, training, and placing prospective teachers in low-income schools.⁴ These individuals do not need to have a completed degree, but must be enrolled in a teacher-preparation program and must have the recommendation of the dean of a college of education or the direct supervisor of an approved teacher-preparation program. In both the emergency certification and intern certification scenarios, the novice teachers are generally required to have a more experienced teacher as a mentor, though the mentoring requirements are not consistent from program to program or district to district and are not prescribed by board rule or statute. Teachers who earn a certificate while an intern must agree to teach in a low-income school for at least two years.

ADE Teacher-Preparation Program Review Process

Most teachers in Arizona are prepared in a wide variety of teacher-preparation programs at public universities or private universities and colleges in Arizona or other states. Arizona education-preparation programs are evaluated under rules and regulations set by the State Board of Education in 2006 and encompass a variety of legislative and public initiative priorities that have been set over the past 20 years. All teacher certification and certification preparation programs must be aligned with the nine professional teaching standards adopted by the board.

The program approval process consists of three distinct parts: a preliminary review containing an institutional profile, framework and faculty model; evaluation of the institutional information and program review by ADE trained evaluators and facilitators using a common rubric aligned with Arizona's standards and requirements; and a site visit to the institution and program. Recommendations for program approval are made to the State Board of Education, who may approve the program for a period not to exceed five years, grant conditional approval, or deny approval. Approved programs offer institutional recommendations for candidates who successfully complete their programs for the appropriate Arizona certificate.⁵

All of Arizona's preparation institutions are regionally accredited. Accreditation, in any field, sets forth a set of common standards and principles by which the quality of professional or institutional preparation may be judged and compared.⁶ Most professions have national accrediting bodies that govern both the preparation and licensure of the profession. One Arizona education preparation program is accredited by the Teacher Education Accreditation Council (TEAC) and none is accredited by NCATE (National Council of Accreditation for Teacher Education) at this time, although Northern Arizona University is a candidate for NCATE accreditation. TEAC accredits 49 programs in 43 universities and colleges nationwide, most of them private institutions. NCATE accreditation is used in 48 states at 588 institutions, either as the required program-approval process, or in partnership with the state-approval process. The vast majority, topping 80 percent, of the nation's teachers are prepared in institutions that are NCATE-accredited or are in NCATE partner states.

Assessing Teacher Quality Issues and Practices in Other States

Teacher quality and quantity are assessed by common measures each year using a variety of data generated primarily by Title II accountability provisions of the Higher

Education Act and the National Center for Education Statistics (NCES). Title II sets out the criteria for the federally required yearly report card of teacher quality indicators from states and institutions of higher education that prepare teachers. Self-reports by states and institutions of preparation as well as a body of research on teacher quality done by groups such as the National Commission on Teaching and America's Future (NCTAF), the Education Trust, and a host of other private and philanthropic organizations are cited in the 2008 annual *Education Week* report, "Quality Counts."

Each year "Quality Counts" seeks to use common factors and formulas to compare the quality of education in states across the nation. In 2008 there were six grading indexes used: chance for success; K-12 achievement; standards, assessments and accountability; transitions and alignment; school finance; and the teaching profession.⁷ The teaching profession index includes three key areas. "Accountability for quality" looks at factors related to licensure, teacher evaluation and performance, teacher education programs, and data systems to monitor quality. "Incentive and allocation" reviews factors related to barriers to entering the profession, portability of licensure and pensions, salaries and incentives, and managing and allocating existing teacher talent. The last category, "building and supporting capacity in the profession," addresses support for beginning teachers, professional development, school leadership and school working conditions.

"Quality Counts" provides a common framework with which to compare Arizona to all other states on more than 50 indicators. This report, dated January 10, 2008, gives Arizona a D-plus in the teaching profession category and a C-minus overall. Only one state, South Carolina, received an A-minus in the teaching profession category. There were 10 Bs, 21 Cs, 17 Ds, and one F. The average grade for the nation in this category was a C. The ratings in

Education Week are consistent across states but do not tell the whole story. In order to get a YES rating, a state must have policy in place that affects the majority of the state's education system. These policies can be constitutional, legislative, or policies of a statewide body such as a state board of education, state standards board or commission, or other state policymaking body. Some of the differences in Arizona's rankings and other states surveyed are highlighted in this section. This information is derived from a random review of state policies⁸ in states indicated as having a policy in place by *Education Week* and interviews with Arizona Department of Education certification staff.⁹ More in-depth discussion of some of the key issues is covered later in this chapter.

Requirements for Initial Licensure

Arizona has a state basic-skills test, but it is voluntary on the part of the preparation programs and is not required for licensure. Thirty-nine other states require a basic-skills test, and it most often is used as entrance criteria for the teacher-preparation program. Since completion of a preparation program is generally required for licensure, this requirement is a part of that process.

Arizona has a required professional-knowledge assessment as a part of the AEPA, but it is not subject-matter specific (related to how to teach subject matter). The state does not require subject-specific pedagogy, though many preparation programs require these courses or imbed them in their content blocks. Teacher preparation programs across the nation have reduced the number of subject-specific pedagogy classes over the last few years as discreet requirements.

Arizona requires student teaching and field experiences but does not specify the number of hours or amount of time required. The state also waives student teaching for those

who have at least two years verifiable teaching experience but no certificate or preparation. All states require some kind of student teaching or internship for traditional certificates, but programs like Teach for America and Troops to Teachers allow a variety of less formal means of meeting these practicum requirements.

Discouraging Out-of-Field Teaching

Arizona, like all states, complies with the federal NCLB requirements for parental notification of teachers that are out-of-field or that do not meet the “highly qualified” criteria, and as most states, has not created separate state policy that delineates these processes. This data is reported in the federal accountability report each year and on individual school report cards. Since 1998 Arizona State Board rules have required that teachers be certified in the content area where they teach more than 50 percent of their day.

Teacher Education Program Success Rates of Graduates

Each of Arizona’s teacher-preparation institutions must report the number of teacher candidates that pass the AEPA each year. All of the Arizona teacher-preparation programs report this data on their websites, although not all are current. The ADE links to all of these websites to the required composite accountability report the state prepares to comply with Title II of the Higher Education Act, but Arizona does not have specific state policies to govern the collection or use of this data for other purposes. Teacher-preparation programs do have follow-up requirements as a part of their program renewal applications, but these are mostly self-report or survey instruments, not a systemic review of their graduates’ teaching performance. A core group of educators, higher education personnel, and ADE staff are working on a pilot project to devise a more comprehensive system for tracking the success of graduates and supporting their efforts in the first years of teaching. Many other states have reporting

requirements, but few have created success indicators for graduates. Most of these states also have tied some type of success in mentoring and induction or performance measures into the licensure or certification requirements during the first three years of teaching. Ohio, Connecticut, and California are good examples of this.

Data Systems to Monitor Quality

Arizona has a unique certificate number for each certified individual. This data is tied to the school district employment reports, but it is not tied to the student record system. A legislative bill, HB 2787, which would specifically provide for the use of teacher and classroom data for the purposes of improving data quality and programs for teachers, is pending in the legislature. The data are confidential (not a matter of public record) and is accessible to the state board, teacher preparation and certification programs, and other agencies approved by the state board. While 46 states have I.D. numbers for teachers, only 12 have created specific connections to individual students. How the data collected are used is state-specific, but of these 12 states, most have restrictions on the collection, use, and reporting of teacher and student data that is focused on school, grade level, or teacher improvement.

The ADE has been appropriated funds from the legislature and has received funding in a competitive grant from the U.S. Department of Education to improve and maintain the data systems for education in Arizona. The completion of this endeavor over the next few years should create the kind of seamless data-management system that will allow all decisions related to teacher quality to be made more reliably and effectively.

Reduction of Entry and Transfer Barriers

Arizona has nearly 100 education-preparation programs for teachers and offers not only a state-approved alternative pathway, but also multiple alternative means to attain a

teaching certificate other than a standard four-year education degree or master's degree in education. No Child Left Behind requires alternative routes to certification — 47 states have them. Arizona has reciprocity agreements with 49 states and reciprocity language in statute and board rule. Reciprocity for most states is defined as having a current license or certificate in a like area, for instance elementary education or secondary science, and a similar background and criminal check. Since each of the 50 states has a unique certification and licensure system, complete and immediate reciprocity is difficult to attain while meeting the statutory and rule requirements of the individual states. Many of the states, like Arizona, will issue temporary or emergency certificates for deficiencies that do not involve investigation into the background check so that individuals can teach while meeting those requirements.

Salaries and Incentives

Arizona teacher salaries, compared to other professions that require like degrees, are 80.8 percent of parity, tied with Texas, and Arizona is 5th lowest in the nation. This number does not take into account performance-based increases unless they are a part of the base salary. All of Arizona's performance pay is a bonus system and is earned yearly. Arizona is one of only seven states that have a statewide performance-pay system defined by statute or other policy and funded by the state.

There are many local and state policy issues that impact teacher pay and key among them are the funding formulas in states and municipalities and the presence or absence of collectively bargained agreements with education unions on behalf of school employees. While the scope of negotiated agreements varies greatly from state to state and in many cases among local jurisdictions, all such agreements address salary and benefits.

All but two states have some statutory definition of bargaining which sets out the processes, timelines, and parameters for both parties of a labor and management agreement. The laws range from those that require collective bargaining where educators have a duly-elected representative (34 states, including California, New Mexico, and Illinois) to those that allow bargaining but do not always require any binding agreements on either side (11 states, including Arizona, Mississippi, Colorado, and Utah). Three states (Texas, North Carolina, and Virginia) expressly prohibit bargained agreements. In nearly two-thirds of the states both local educators and governing bodies are bound to the terms of the agreement for its duration unless both sides agree to changes.

Very little actual research or scholarly review has been done on the effects of collective bargaining in the last 20 years, though much political and editorial rhetoric has been published. Most recently, some comparison and reviews have been done by Harvard University and the Brookings Institute (2007), and by the National Commission on Teaching and America's Future (2007), but the focus has been primarily on the effect of agreements and bargaining on implementing education reform. Even then, these two reviews have widely divergent views, though they reach a similar conclusion: that a new, reformed collective-bargaining may be required to achieve real school reform. A cursory review of the states with strong collective-bargaining laws indicates those states have the highest salary parity with other professions and the largest percentage of budgets spent in the classroom. But this finding is not uniformly true, indicating that the complexity of bargained agreements, school funding, and economic and cultural conditions may all play a significant role in teacher-pay decisions.

State statute in Arizona permits "meet and confer" and allows districts to enter into good-faith agreements with their employees; however, these agreements are not binding on

either party and are subject to change at the will of the local governing board. Nearly one-third of Arizona's school districts have no formal process for meeting, consulting, or bargaining with their teachers, making the process of setting salaries and benefits solely the purview of the district administration and governing board. In many more districts the process consists of informal conversations and agreements. The larger districts in Maricopa and Pima Counties have long-standing agreements with their teachers. Small and rural districts are the least likely to have formal agreements. For the most part, the lowest average salaries are in many of the rural and remote districts, or the small urban districts.

Managing and Allocating Teaching Talent

Arizona has a basic tracking system for teachers as a part of the certification unit and reports that data primarily as a function of the federal accountability report, but general data related to certification, employment, mobility, and salaries is not readily available and transparent for local district or public use. This situation can make it difficult to maximize the use of the current certified teaching population and target real areas of need.

Arizona is much more successful at providing some creative incentives for talented teachers, but even then these tend to be local or limited state projects and not part of a larger system of ensuring overall teacher quality, particularly in high-needs districts and schools. Individual districts and some state programs, such as the state-funded master teacher program and the privately-funded Rodel exemplary teacher program provide incentives for teachers to stay in high-needs districts and to become mentors to younger teachers. The master teacher program also supports the national board certification process in high-needs schools and for targeted populations with a commitment that those individuals stay in those schools after they complete the process. There are 451 national board certified teachers, many from low income

and rural districts teaching more than 30,000 students collectively. Seventy-six Rodel exemplary teachers mentor teacher-education students during their student teaching. To date, 300 student teachers have been mentored; 120 are teaching, and 80 will enter the teaching force next fall. Some districts also provide bonuses or incentives to teach in high-needs schools or shortage areas.

There are a number of programs in partnership with higher education that are supported by private, state, and federal grants that encourage teacher assistants or others to complete their degrees and licensure requirements and stay and teach in defined high-needs schools. School leadership incentives and leadership preparation initiatives are just beginning in Arizona in partnership with universities, the ADE, and a host of private philanthropic organizations. The result is a widespread but less systemic effort to encourage and keep talent in these schools. Most states face the same dilemma, though there are a few that have targeted incentives for both principals and teachers who agree to work in high-needs schools and districts. The best of these also include support and training as well as financial incentives.

Teacher Work Week and Workday

Another key factor in distributing and managing talent is the length of the school year and day and the manner in which that time is structured. The official teacher workday, week, and year are generally defined by local or state policy. Teachers in Arizona are required by statute to teach at least 180 days and the number of minutes per day is set by grade-level as well. Local governing boards develop their school attendance days and calendar for students and teachers. They may extend beyond the allotted times but not go below them except in certain special circumstances. Teachers are contract salaried employees and are assigned by school administrations to their positions based on local policies. The workday very often is

defined by student attendance and some limited time before students arrive and after they leave. That time often is used for supervision of students in common areas, tutoring, extra-curricular activities, faculty meetings, parent meetings, or mandated professional development, leaving much of the instructional planning for time outside of the actual defined day. The Arizona Working Conditions survey in 2006 and in 2007 found that less than 50 percent of Arizona's teachers have more than three hours of non-instructional time per week to prepare for instruction.

Most teacher contracts include between 190 and 200 instructional and work days, or the equivalent of 38 to 40 full-time weeks throughout the year. The actual disbursement of time varies by district. Many districts still have a traditional start in early to mid-August and end in late May or early June. More and more districts have a modified year-round calendar, beginning in July and finishing in late May. While there are breaks during the year, teachers often teach intercession during at least one of those times and have a limited four to five week summer break. Survey data from teachers nationwide indicates about one-third of all teachers also work on additional district contracts during the summer, and another 10 to 15 percent are taking coursework or professional development — often at their own expense — during much of the time they are not teaching.¹⁰

School Leadership

Arizona has standards for licensure of its school administrators. Approved preparation programs must have an internship, but there are waivers to this requirement and the length and breadth of such internships is very broad and inconsistent. Mentoring of new principals is provided on a district basis or as a part of grant projects such as AZLEADs, Beat the Odds, the ASU University School Partnerships, and the Rodel Foundation. These programs touch less

than 10 percent of the principals. Induction and mentoring for school principals is even rarer than it is for teachers. Comprehensive state models are very difficult to find, though strong district programs are more common. Use of a blended coaching model that pairs novice administrators with recently retired administrators is the most common.

School Working Conditions, Safety, and Facilities

For the past two years, Arizona has engaged in the Teacher Working Conditions Survey (TWCS) that asks teachers and administrators their perceptions in five domains; school leadership, facilities and resources, teacher empowerment, time, and professional development. In 2006, 78 percent of the teachers and administrators in pilot districts participated and in 2007, 53 percent, or nearly 32,000 teachers and principals responded. The survey is a secure computerized inventory that all teachers are invited to complete. The Arizona findings are not significantly different than other states, but they are not yet readily used by the state or by districts as a measure of school improvement. There are only three states that have routinely given such a survey and can report data over a period of time.

Overall, the TWCS indicates Arizona educators believe they work in a safe school environment, but there is large discrepancy between teacher and principal views, with 77 percent of teachers saying the environment is safe and 97 percent of principals indicating the same. Elementary teachers report working in safer environments than do middle and high school teachers. This could be in part because only 52 percent of teachers believe there is consistent enforcement of rules for student conduct, compared to 94 percent of principals who believe the rules are enforced consistently. Data from the TWCS is available online for schools and districts which had at least 50 percent of their teachers complete the instrument. The aggregate state data is available for all educators and the public to view.

The Arizona Department of Education also completed a four-year school safety study in 2007 which shows no demonstrable change in the incidence of violent and serious behavior in schools over that period of time. The report uses data from the National and Arizona Youth Risk Behavior Surveys (YBRS) and the Safe and Drug-Free Schools (SDFS) report. These include a combination of data from administrative reports regarding school discipline incidents and student reports. The 2005 YBRS indicates that three highest incidence issues noted by high school students, on campus in the last 12 months, are being offered, sold, or given an illegal drug (34 percent), theft and vandalism of property (29 percent), and being harassed or bullied (25 percent). The drug category was the only category higher than the national average. The incidents reported by administrators as happening most often were threats, physical attacks, or fights without weapons, intimidation and bullying, and vandalism. Those reported the least often were use of a firearm or destructive device, hazardous or biochemical threats, robbery with a weapon or force, and rape or sexual assault.

As a part of the federal grant to improve management of drug and violence prevention programs, the ADE is creating a school safety-incident management system called Arizona Safety Accountability for Education (Az-SAFE) to assist in the tracking and data collection related to school incidents.

The 2007 WCS indicates that 64 percent of Arizona teachers feel they have sufficient space to work productively. Only 59 percent believe they have adequate access to technology. The School Facilities Board, an entity unique to Arizona, routinely monitors school facilities and conditions. Since its inception, the School Facilities Board has completed initial repairs and construction on hundreds of schools in Arizona. The School Facilities Board assesses the needs of districts and uses a set of standards and formulas to allocate funding for buildings and

repairs. The legislature is required to provide funding for new school facilities and does so each year through its appropriations process. Maintenance of existing facilities has several times been underfunded or put off until the following year because of budget pressures.

Arizona does not have a statewide class-size-reduction policy, but it is one of the options for expending Proposition 301 money. A number of school districts have taken advantage of the opportunity, especially in the lower grades. Districts track student-teacher ratios and some have class-size policies to reduce class size or provide support after a certain number is reached.

Professional Development Requirements and Opportunities — Support for Beginning Teachers

Arizona does not routinely track the number of mentoring and induction programs to support teachers new to the profession. The last data collected on a statewide basis is now more than six-years old. Induction refers to the time spent assisting a new teacher in acclimating to the profession, while mentoring is an ongoing relationship to assist in the development of professional skills necessary to become an accomplished educator. Most school districts in Arizona reported having some kind of teacher orientation or induction, but very few had sustainable mentoring and support programs for teachers in years 1 to 3. There are many district models of support for new teachers, ranging from weeklong orientations and buddy or mentoring systems with experienced teachers, to full-time mentors and content-area instructional coaches working with teachers in their classrooms on a regular basis, but these opportunities are not consistently offered to or focused on the newest teachers.¹¹ Arizona has induction standards, but the State Board of Education does not require districts or programs to use them in the development of their mentoring programs. The ADE has mentoring training as a part of the alternative pathways certification and the master teacher program supports and

trains full-time mentors in 19 school districts. There are several exemplary state models where mentoring is required and state-funded for all beginning teachers. In nearly half of the states some mentoring and induction is required by policy and in many, completion of the induction and mentoring is required as a part of state licensure.

There is a wide body of research that supports the notion that induction, mentoring, and quality professional development will improve quality teaching and positively impact attrition and student achievement, yet states are investing very little in systemic efforts to invest in the human resources structures necessary to provide these things to the profession.¹² Teachers enter the profession prepared at a basic level and often need the guidance and support of a more experienced and accomplished colleague in order to be successful.

Across the country states are beginning to look at the cost of attrition with just as keen an eye as the issue of recruitment. It is estimated that the nation spends more than \$2.6 billion dollars annually on teachers dropping out of the profession. Arizona's projected loss is nearly \$88.5 million dollars.¹³ An estimated 6 percent of the nation's teaching force will leave the teaching profession permanently each year. Fourteen percent of new teachers leave during their first year, 33 percent leave within three years and almost 50 percent leave within the first five years. These numbers are even higher for those teaching in high-poverty schools.¹⁴

Induction and mentoring programs for teachers are a combined effort to pair experienced educators with novice educators in order to provide orientation to the profession, systemic support, and ongoing coaching in teaching practice. These programs have demonstrated success at keeping new teachers in our schools. The New Teacher Center at UC Santa Cruz (NTC) tracked individuals who had been a part of their mentoring program after six years and found that 94 percent were still in education and 88 percent were still in

teaching.¹⁵ The NTC has emerged as a leader in this effort across the country. It defines eight characteristics of quality mentoring and inductions practices: rigorous mentor selection based on qualities of an effective mentor, ongoing professional development and support for mentors, sanctioned time for mentor-teacher interactions, intensive and specific guidance moving teaching practice forward, professional teaching standards and data-driven conversations, ongoing beginning teacher professional development, clear roles and responsibilities for administrators, and collaboration with all stakeholders.¹⁶ While the NTC model is intensive, research also shows that some mentoring is better than none and that states get a higher return on their investment the higher their teacher retention is. The NTC estimates that for every dollar invested in mentoring and induction, a quality mentoring program provides a return on investment after only five years of \$1.66.¹⁷

In Arizona induction and mentoring is defined primarily by individual school districts. Over a period of seven years two Governor's Commissions on Teacher Quality and Student Achievement (2001 and 2007), The Governor's P-20 Council (2007), the Rodel Foundation's "Lead with Five" report (2005), the Teacher Education Partnership Commission's report, "Quality Teacher Preparation Programs" (2006), and the Morrison Institute for Public Policy's report, "Is There a Teacher Shortage?" (2003) all have recommended that Arizona invest in induction and mentoring programs for its newest teachers.

In 2007, nearly 53 percent of all Arizona educators participated in the working conditions survey. Data was disaggregated for those participating in a mentoring program either as a mentor or new teacher. The data suggests that mentoring practices are inconsistent across participants, with less than half reporting that they have a mentor. Those that do report having a mentor are sometimes mentored by novice teachers themselves or by individuals with

heavy caseloads of new teachers or a full-time teaching position in addition to mentoring responsibilities. This survey also found that 63 percent of teachers in their first through third year who were assigned a mentor intended to stay in the profession compared to 54 percent of those who said they wanted to leave.¹⁸

An analysis of 28 Career Ladder plans and coaching and mentoring structures in the 23 districts participating in the Master Teacher Mentor program in Arizona indicate that many induction and mentoring programs provided by districts are a combination of identified orientation and professional development activities, some limited classroom observation by peers, and a mentor teacher who also is teaching a full class load. Some provide limited training to the mentor and have some system of conferencing and collaborative work with their mentee. Career Ladder districts have some of the most sophisticated mentoring as a result of using their more accomplished teachers to work with the newest teachers in their districts, but few of them even have a release-time model that is focused on the key criteria used by the NTC to evaluate best practices and quality. The Master Teacher Mentor program districts all have transitioned to a full- or half-time release model, with extensive training and professional development as well as a clear and consistent selection process. Still, many of these districts do not adhere to the 1:15 ratio and since the Master Teacher Mentor program is limited to high-needs schools; it is still often inconsistent, even within the district. It also is common in Arizona for districts to utilize instructional coaches in content areas to provide some coaching to new teachers, and in far too many cases this means that the new teachers will often see 2 to 3 different support individuals that each focus on discreet content. Some of the other critical issues for new teachers, such as classroom discipline, organizing and planning instruction, and communicating with parents and colleagues often are secondary to efforts that are more

focused on helping implement a particular program or curriculum in the content area. Often these coaches are not dedicated to new teachers, but are asked to provide support to entire buildings related to a content focus.

In addition to programs offered through universities and school districts, in order to meet the identified need for new teacher support, Arizona has implemented two programs in targeted needs and geographical areas statewide. The Arizona Department of Education provides training from the NTC to mentors of teachers participating in the alternative pathways to certification. These mentors are assigned to individuals who are participating in the certification program and already are teaching. Some of the mentors are released from teaching to mentor and others maintain a full-time teaching load while mentoring. There have been 80 mentors trained in five districts in the last three years. This program is funded with federal grant dollars. The ADE also hires Accomplished Teacher Leaders for Academic Success (ATLAS) mentors that are assigned by the ADE to schools not meeting adequate yearly progress as a part of the school-improvement process. These ATLAS mentors serve as school-improvement coaches and content-area coaches, but these individuals do not work exclusively with new teachers.

The Master Teacher Mentor Program began with a federal grant and is now funded primarily with a state appropriation through the State Board of Education and the Arizona K-12 Center. There are 23 districts and 68 identified master teachers, 43 of whom are mentoring new teachers in districts with formal agreements to provide mentoring and induction on a full- or half-time basis. There are 485 new teachers impacted by mentoring, reaching an estimated 28,000 students. The program also subsidizes training for mentors in districts who are not a part of the Master Teacher Mentor program but have a desire to implement programs in their

district. In the nine federal-grant schools and districts the first three years of data indicate that in the 26 schools overall teacher retention increased to an average of 84 percent and new teacher retention to 74 percent. At 13 of the 26 schools, overall teacher retention was 100 percent.¹⁹ All of these programs meet six of the eight key criteria indicated by research from the NTC.

These two programs represent 15 to 20 percent of the roughly 5,000 teachers ADE estimates are new to the profession (in their first two years) each year. Together with the Career Ladder mentoring programs Arizona provides some formal induction and mentoring to 40 to 45 percent of all new teachers in the state. This estimate is consistent with the survey findings of the Teacher Working Conditions Survey, which reported just fewer than 50 percent of the new teachers surveyed, indicated they were provided a mentor.

Professional Development

The Arizona Department of Education has adopted the National Staff Development Council (NSDC) standards for professional development and these standards are commonly used in school districts with comprehensive professional development plans. The state has a number of programs and initiatives that include professional development opportunities and funds, but no statewide requirements or guidelines for professional development and no state-specific funding that is required to be used for professional development. A portion of Proposition 301 money can be used for these efforts and in many districts that is the case. A portion of Career Ladder funds also may be set aside for this purpose as long as it is related to the other goals of the program. There is no specific requirement that professional development be aligned to state professional standards or student standards, although the school improvement planning process does require demonstration of alignment. Nearly half of the

states do provide specific funding and alignment to state standards. Many of these models are directly related to school improvement efforts and to meeting professional development requirements for licensure or certification.

The Governor's Committee on Teacher Quality and Support did the most recent analysis of professional development in Arizona in 2007. That committee reviewed recommendations made by the P-20 Council and incorporated them into an overall recommendation to "build strategic and systemic professional development" for Arizona's educators. This committee spent nearly two years examining practices and trends in professional development for teachers in Arizona and concluded that while there were many districts where professional development planning and implementation was sophisticated and aligned, even then it often fell short of teachers' expectations for personal and professional growth and there were few instances where the effects of professional development were actually assessed in terms of impact on teaching practice or student achievement. Summary statements of current status from that report are contained below and have been updated for this report.²⁰

Individuals and districts primarily define professional development, though there are some statutory and SBE requirements. The most significant requirements are the 45 to 60 hours of instruction in sheltered English immersion (SEI) strategies and the 180 hours of standards-based professional development required for certification renewal. While there are many entities that provide professional development, most opportunities are accessed through local school districts or county offices. The cost per teacher of professional development appears to vary greatly across the state although very few districts can actually report what

they spend per teacher on professional development, or how much time is allocated for targeted efforts during any given year.

Professional development is defined very differently by teachers and administrators, and varies from district to district and school to school in terms of content, relevance, amount, availability, and quality.²¹ Staffs in large and medium districts often have more opportunity at a lower cost to educators. Small and more isolated districts have challenges with accessibility, cost, and quality.²² The ADE, universities, and community colleges, county education service agencies, the Arizona K-12 Center, and a host of private entities and consultants all offer professional development to schools and teachers, generally at some cost or as a part of a particular grant or program. Some technical assistance is provided through a variety of efforts at the ADE, but they are generally content or program driven, such as Reading First, or Professional Development Learning Academies (PDLA), which a district must pay to attend over a three-year period of time. PDLA gives district or school teams an opportunity to plan and begin implementation of professional development that is more aligned and embedded into the school week and year.

Arizona does not have a central or regionalized system for identifying quality providers and providing that information to school districts. The ADE has preferred providers or approved vendors for some programmatic efforts, such as Reading First, technology training, and SEI, and they publish a professional development catalog on-line each year.

Arizona has 13 county offices, all with some education responsibilities, mostly related to administrative functions. The exceptions are those counties that have created education service agencies (as allowed by statute) to provide support to teachers and administrators. These entities work with school districts in their immediate area to provide professional

development opportunities utilizing some state and county dollars. They have a variety of configurations and capacity, and are governed by the County Superintendent of Education offices. Over the past few years the ADE has funded or partially funded 13 technology integration specialists, and 25 reading and math specialists that sometime work through the county education service agencies and sometime work with districts directly out of the ADE.

While there are many opportunities in Arizona for professional development, there is little overarching coordination of opportunities or information. The ADE has compiled a publication that includes a wide variety of programs. The institutions of higher education also list some choices in addition to their degree programs on their websites and the K-12 Center has a list on its website of available opportunities throughout the calendar year. Some regional access is available, but it often is limited in its scope and focus, unevenly distributed across the state, and is not consistently based on local needs and directly designed to meet state and national standards.

Alignment of standards, professional development, and programmatic efforts continues to vary greatly from district to district and school to school. Professional development too often is linked to data and standards after the fact, if at all. Districts require professional development around new programs or curriculum they have adopted, generally provided by the vendors, not necessarily developed based on an analysis of the relevant content and strategy needs of individuals or groups of teachers. Teachers often choose things that interest them and that they want to learn rather than looking at data and reflecting on strengths and areas of improvement. Standards often are applied after the professional development is designed, rather than driving the design and delivery itself.

Arizona has no consistent funding or implementation structure for professional

development. Districts struggle to define the time and money necessary to do what is required within their budgets and school schedules without disrupting student learning. Larger districts create their own technical assistance for a broad range of staff, and even then it often appears disconnected to the teachers. Smaller districts and rural or isolated districts rely on the limited technical assistance available from the ADE or other entities and contracted vendors associated with particular programs or grants. The issues of identification, alignment, and funding of appropriate professional development continue to be a significant policy issue for the legislature, the SBE, the ADE, and local governing boards.

Standards and Assessments for Teaching — Teacher Evaluation and the Performance-Review Process

Teacher evaluation processes and tools vary widely across the state and the nation. All states have some statutory requirements for teacher evaluation and some are far more prescriptive than others. Generally, local governing bodies are required to designate persons responsible for teacher evaluation and in most cases this is the building administrator or their designee. Many states require trained evaluators.

In Arizona the statutes require the local governing board to establish a teacher evaluation system to “improve instruction and maintain instructional strength.” They must involve certified teachers in the development and review of such a system, and it must address four key components: a reliable instrument based on criteria for measuring effective teaching performance, an assessment of competencies as they relate to those criteria, specify a minimum number and duration of classroom observations, and include specific and reasonable plans for improvement. The state does not tie teacher evaluation specifically to student achievement except to indicate that the evaluations must be tied to the state standards. Governing boards must establish an appeal process if the evaluation is used for determining

any type of compensation, and they must designate evaluators and ensure that they are trained.²³ Most Arizona school districts complete some form of evaluation training for their administrators and others who are evaluating teachers. This ranges from an introduction to the instrument used and the times to much more extensive training that includes practice and checks for inter-rater reliability. More than half of the states have either a standard state evaluation tool for teachers or training for evaluators on how to use it appropriately. There are other references to the use and timelines of evaluation in separate Arizona statutes on Career Ladder and certificated personnel dismissal.

The majority of teacher evaluation in Arizona is done by principals or other site administrators, and consists of completion of a pre-evaluation conference, a 30 to 60-minute observation, and a post-evaluation conference to review the results. In most districts, teachers with fewer than three years of experience are generally observed twice yearly and teachers with more than three years experience are generally observed only once yearly. Many formal evaluation processes allow for as many observations per year as administrators deem necessary, but it is uncommon for the majority of teachers to be observed by evaluators any more than the minimum amount required unless the teacher is experiencing some difficulty.

In the early 1980s, many school districts created teacher evaluation checklists based on the work of Madeline Hunter's key elements to lesson planning. As the state and nation moved toward a standards approach to education, many Arizona school districts revised their evaluation instruments to be more closely aligned with the Arizona Professional Teaching Standards and the National Board for Professional Teaching Standards five core propositions on teaching. These evaluation instruments often call for the collection of evidence related to student growth and ongoing collegial approaches to instructional practice. The work of

Charlotte Danielson shaped many of this new generation of teacher-evaluation tools around the four domains of professional practice: planning and preparation; the classroom environment and instruction; professional responsibilities; and the rubrics that define the levels of teaching as unsatisfactory, basic, proficient, and distinguished.²⁴

The past two decades have brought major enhancements to this formalized evaluation system throughout the state and nation. The increase in coaching and mentoring has brought peer observation and guidance into classrooms of new and experienced teachers alike. One example is the use of the Formative Assessment System (FAS) tools from the NTC. There are at least 19 school districts in Arizona using these protocols with new teachers and mentors each year to review and analyze instruction and student work.

Whole school improvement processes highlight the need for continuous improvement in instruction and have given birth to a host of programs that provide observation protocols and feedback to teachers regarding the quality of their instruction. Principals, department chairs, district content-area specialists, and on-site coaches and mentors have all taken advantage of utilizing these tools to complete observations that provide ongoing assessment of the use of certain instructional strategies in classrooms.

In Arizona, the Sheltered Instruction Observation Protocol (SIOP) is used widely as a result of the training thousands of administrators and teachers have been exposed to as a part of the required SEI endorsement. While the instructional strategies used as a part of this protocol were designed for English-language learners, they are found to be useful and beneficial to all students in the classroom.²⁵ School districts in Yuma County have participated in the West Ed Teach for Success (T4S) effort where teachers and administrators use a classroom observation protocol that looks at seven different aspects of effective instruction.

And several school districts in Maricopa County have completed extensive training in techniques to evaluate instructional design and examine and develop specific knowledge and skills to improve teaching and learning.²⁶

The formalized evaluation process is viewed by many teachers as a necessary requirement and only marginally helpful to providing real feedback on their instruction and effectiveness. Many of these tools can provide opportunities for dialogue, discussion and analysis of teaching. Lessons from key findings in the Beat the Odds schools tell us this type of information can lead to improved teaching and learning, especially when coupled with the examination of other school and classroom based data examined and used in a collaborative fashion.²⁷

State Tests for Certification

Testing for licensure or certification in professional and paraprofessional fields is a common practice. These assessments are specific to the professional discipline and are generally administered by state boards for that profession. Those professions that require the most similar education as teachers for entry into the profession (a bachelor's degree that includes specialized training in the discipline) include nurses, accountants, architects, and in some cases engineering. A license is required for all nurses, CPAs, and architects, and for engineers (under certain circumstances). All of these professions are regulated by boards of practitioners and all require separate licensure in the state they are practicing in, though some reciprocity is allowed under certain conditions.

Arizona statutes require teachers applying for a certificate to pass a proficiency examination in subject matter and professional knowledge, and to complete coursework or an examination on the United States and Arizona constitutions in order to be certified.²⁸ This

content and professional knowledge test is called the Arizona Educator Proficiency Assessment (AEPA) and was developed by Education Systems-Pearson (formerly National Evaluation Systems NES) and adopted by the SBE in 1999-2000. It continues to be revised and administered by Education Systems (ES) and offers both administrator-proficiency assessments and teacher-proficiency assessments in 34 subject-matter areas. Those seeking a new certification in any area where there is an assessment must take that assessment. If there is not an assessment, they must have 24 hours of coursework in that content area. There is legislation pending that would eliminate the AEPA requirement for anyone who meets the 24-hour coursework requirement.

All states have teacher-testing requirements as a part of initial licensure or certification and most require content-specific assessments for adding additional subject-matter areas or obtaining additional certificates. There are two major teacher-testing companies in the nation. ES creates customized assessments based on individual state standards and tests more than half of the nation's preK-12 educators in 15 states. Education Testing Service (ETS) has a division on teacher testing called PRAXIS, which administers a battery of tests in 38 states that they have developed in major content areas and professional knowledge. Only Connecticut uses assessments the state has designed. Both testing companies have developed performance assessments for licensure purposes, but these are used on a much more limited basis. Ohio uses the Praxis III from ETS and New York State uses a customized performance assessment designed by ES. As noted earlier, when discussing elementary certification requirements, Arizona has not yet identified a performance assessment for the purposes of licensure.

Federal Policy — No Child Left Behind

The No Child Left Behind Act of 2001 (NCLB) was passed as the reauthorization of a long-standing piece of federal legislation, the Elementary and Secondary Education Act of 1965 (ESEA). This act has 10 titles covering nearly every aspect of federal funding and regulation for public education, with the exception of special education, which is regulated through the Individuals with Disabilities Education Act (IDEA). This reauthorization of ESEA was the most sweeping in decades, bringing new requirements for student testing, teacher quality, and whole-school accountability. The goals of NCLB have been nearly universally accepted; making sure all children have access to quality teachers and quality education, closing the achievement gap between all subgroups of students and measurable accountability for schools and districts. The actual implementation of NCLB has been more hotly debated, with many views on both sides regarding the positive or negative impact on our schools, teachers, and students.

Teacher quality is regulated under Title II of the act. The most significant element of NCLB is the “highly qualified” requirement. When NCLB was passed, it simply said that local education agencies (LEA) must ensure all teachers were “highly qualified” and receiving “high-quality professional development.” No definition or regulation was set forth for nearly a year, and there continues to be broad interpretation between states in implementing this component of NCLB. All teachers, including those in public charter schools, must meet the “highly qualified” criteria, though charter-school teachers are allowed different options for meeting the criteria than public schools that require certification. All teachers were required to be “highly qualified” by the end of the 2005-2006 school year.

In August 2003, Arizona adopted an evaluation form and rubric for Arizona “highly

qualified” teachers, pursuant to the requirements mandated by NCLB. The three main evaluation criteria are:

- 1) A bachelor’s degree.
- 2) A valid state teaching certificate in the subject area or grade level in which they are teaching (this requirement does not apply to charter-school teachers).
- 3) Passage of the Arizona Educator Proficiency (AEPA) professional knowledge- and subject-knowledge test in the content area of teaching assignment or one of the following:
 - a. An advanced degree in their core academic-subject area.
 - b. National board certification in the area of their teaching assignment
 - c. Twenty-four hours in the core academic-subject area.
 - d. One hundred points on the Highly Objective Uniform State Standard of Evaluation (HOUSSE) rubric applicable to their field of teaching.

Each state developed its own HOUSSE and had it approved by the United States Department of Education (USDOE). The HOUSSE rubrics were available for all teachers until May of 2007, when the USDOE suggested strong limits on their use to states and Arizona began restricting the use of that option for most teachers.

Schools are required to provide data about the number of “highly qualified” teachers they have each year and to inform the parents of any child taught by a teacher who does not meet the “highly qualified” criteria. The criteria and rubrics are especially difficult for special-education teachers who teach multiple content areas and levels and for middle-grade teachers who are elementary certified and teaching in content areas. Rural schools that have teachers teaching in multiple areas also have had a great deal of difficulty. These populations still utilize the HOUSSE rubric to be highly qualified, but often it requires teachers to take coursework, professional development, or assessments to meet the criteria.

Arizona reports its “highly qualified” data each year as a part of the federal reporting requirements by number of classes taught by teachers who are not “highly qualified,” not by the number of teachers who do not meet these criteria. In 2005-2006, 5.3 percent of the state’s classes were taught by teachers who were not “highly qualified.” That number was 7.5 percent in high-poverty schools, compared to 2.6 percent in low-poverty schools. According to the state report, the majority of these classes are taught by emergency-certified teachers or teachers without a bachelor’s degree who teach in charter schools. There were 1,163 teachers, or 3.8 percent of the teachers on emergency certificates, and 670 of those were in high-poverty districts. There are 104 teachers teaching without a bachelor’s degree.

Case Studies and Best Practices — The Connecticut Beginning Educator Support and Training Program

Connecticut began the BEST program in the 1999-2000 school year and has been adding content and grade level specific portfolio assessments each year. The program requires two years of local mentoring and support, professional development, and the completion of a portfolio assessment prior to achieving a provisional educator certificate. Teachers are required to submit an electronic portfolio with a video component to reviewers by the end of the second year. The state developed the program and the assessment over a five-year period of formative evaluations and pilot studies prior to being used to determine licensure.

Over this time, the state analyzed the data and compared the performance of teachers prepared in Connecticut institutions with those prepared out of the state. They have made refinements in the system over time — by the 2005-2006 school year, 92 percent of the state’s new teachers participate in the portfolio-induction program. Those that do not are in low-incidence areas and participate in mentoring and alternative demonstration of the standards in their area.

The state provides training and support for district facilitators, mentors, and new teachers, as well as funding for the mentoring programs in districts. Districts create their own programs and submit them to the state for approval. The program has three key components; school-based mentoring, statewide regional online seminars, and the portfolio assessment.²⁹

California Beginning Teacher Support and Assessment (BTSA)

California has the longest-standing support system for new teachers in the country. It began in 1992 and since 2004 all new teachers are required to complete a BTSA program in order to achieve a permanent teaching credential. BTSA is jointly administered by the California Department of Education and the California Commission on Teacher Credentialing. There are multiple providers of these programs and they are driven by six regional consortiums of providers. The system is aligned with the California Standards for the Teaching Profession, state student academic standards, teacher preparation programs, and professional growth opportunities.

The program includes two years of induction for new teachers that must have a formative assessment component. The NTC developed one of the first assessment tools used and has completed numerous research studies on the effectiveness of the program. In several comparisons, they have found that teachers who have been mentored by full-time trained colleagues in the same field as the new teacher have consistently better retention rates and their students score consistently higher on statewide assessments.

California funds the BTSA programs on a formula of \$3,900 per new teacher that the school districts must match with dollars or in-kind contributions. California's 20 teacher induction standards guide the design and implementation of local BTSA programs.³⁰

The Georgia Master-Teacher Program

The Georgia Master-Teacher Program was established in 2006. It is a joint partnership of the Georgia Professional Standards Commission (GPSC), the Georgia Department of Education (DOE), and the Governor's Office of Student Achievement. The process is an electronic submission and is scored at the state level. Teachers earn a master-teacher certification and become eligible for stipends and leadership roles such as mentoring new teachers and serving as academic coaches.

The master-teacher certification is open to all levels and most subject-area teachers. The primary requirement is documented student progress over time but it also includes verification of professional responsibilities and leadership roles. Teachers must maintain their master-teacher status by providing ongoing evidence of professional growth and student achievement, but their Georgia teaching credential is automatically renewed as long as they maintain this status.

Local districts make decisions about training and placement of mentors and coaches. Online support for the application process and ongoing professional growth is available to these master teachers. The state collects data through the GPSC commission on the long-term effect of the project on teacher quality and retention.³¹

The Georgia Professional Standards Commission Online Certification and Data System

The GPSC is an independent and autonomous licensing body for educators in Georgia. The commission regulates certification for all educators and approves all teacher-preparation programs. Over the last 10 to 12 years the GPSC has moved to a paperless certification and renewal system in almost all instances. There are 180 school districts and 140,000 educators including paraprofessionals who also are licensed.

School districts and teachers can access initial and renewal information, forms, and verifications online and, in most cases, have their certificates renewed or issued in a matter of hours or days. The system uses a web-based model and secure fax system that transfers all paper copies to an electronic image, assigns an I.D. number if the person is new, sorts and stores the information, and makes it available in multiple sorting options for direct access by the candidate and by the school district. Each district has a password and can access all employed educators in the system by certificate number or social security number. Educators can enter their personal I.D. from the public website and check the status of their application or renewal.

Most certification is done through the Express Lane, a program that generates an immediate response about what requirements teachers have already met and which ones need to be met. For instance, if teachers have taken the teacher assessment, it informs them of the date the test was taken and the teacher's score. If the test has not been taken, the program informs the teacher what she or he needs to take and when the next assessment date is.

The commission and the DOE share information and databases. This allows the commission to create a "highly qualified" database where principals can look at all the teachers they supervise to determine their status. The system will generate a "remedy" if the person is not "highly qualified," and provide all the information, forms, and requirements, including options for an individual professional development plan. Districts can do the same thing on a larger scale.

The data is compiled and sorted so that it creates an equity database that is connected to student performance in the aggregate. This database creates profiles of teachers and schools. For instance, a school profile would contain the student demographics of a school, the teachers

and their experience, certifications, and degrees, turnover rate, and if the school had made AYP. A principal can then compare their school to all other schools in a district, against state data, or to schools with similar demographics.

The system brings together all reporting systems from the state, teacher preparation programs, accreditation visits, certification data, employment data, and aggregate student data. Local districts input directly into the system and then are able to access the data at any time for their own use. The commission plans to update its site in 2008. The majority of this work has been done by a team of in-house specialists, with feedback from the users, districts, and teachers. The next steps for the system are to provide longevity tracking for institutions of higher education and to track professional development efforts of educators so that they can enrich the profiles.³²

The West Virginia Department of Education Teach 21 Website

This website was launched as a resource to teachers following a significant revision of the West Virginia student and teacher standards to reflect 21st century skills. It is a resource and professional development tool for teachers and is accessible to the public at large. Just launched this fall, the fledgling website is full of promise. It includes interactive sections with all content standards and objectives by grade level and subject area and can be sorted to find resources for performance assessments and teaching 21st century skills. The state has defined its “power standards” or those that are most essential to doing well on the assessments. There are instructional guides, technology tools, sample student assessment prompts, and questions that also can be sorted by grade and subject.

The professional development section includes a blog, a wiki, and an “ideas from the field” section so West Virginia teachers can post innovative ideas for all to share. A main

feature of this is the content video section. This section allows the educator to look at a video of practice in math, science, social studies, language arts, or pre-K, and provides a facilitator guide for reflective questions and notes as the educator proceeds. There are lesson plans, worksheets, assessments, and other materials that accompany each area.

Teach 21 offers a real look at the future of building professional community in a technology-rich fashion. It connects the real world of standards and assessments to teaching practice and provides opportunities for individuals or groups of teachers to easily access relevant and useful tools for their classroom.³³

Summary

Issues of preparing and maintaining a quality teaching force are complex. The broad spectrum of views on what constitutes teacher quality contributes to the difficulty in measuring it, though there is an emerging definition of a quality teacher that holds promise for future efforts. The National Commission on Teaching and America's Future (NCTAF, 2003) compiled a list of ten key attributes and skills a beginning quality teacher should know and be able to do. The Teacher Education Partnership Commission in Arizona espoused a similar definition in their 2005 policy report.³⁴ Policymakers, districts, and schools could use this work to guide the development and maintenance of a quality teaching force.

Quantity is an easier and more attainable measurement, but even then, the number of teachers available may not necessarily mean they have the skills and dispositions to teach in the classrooms that need them the most. K-12 teachers make up nearly 4 percent of the entire workforce in this country. There are twice as many K-12 teachers as there are registered nurses and nearly five times as many teachers as lawyers or professors.³⁵ As noted earlier, we lose

between 30 and 50 percent of those teachers in the first three years, making retention of quality teachers equally, if not more important than, recruitment.

Refined data systems are needed to analyze the real needs of schools and the state in terms of teacher quality to enable identification of target areas for recruitment and preparation, evaluation, and professional development necessary to sustain a quality teaching force.

Arizona has a growing student population and an aging teaching population. Preparing now for the next decade will ensure our communities have the quality teaching force all of our students deserve.

Chapter 4

The Costs of Teaching

Roseanne Lopez

The education of our children comes at a price. This chapter examines the structure of school finance in Arizona, compensation rates for teachers, recruitment and retention issues, and suggestions for possible new ways to look at teacher pay. To better understand where the majority of funds for salaries are generated and allocated, we begin with a brief overview of the complex school finance system in Arizona.

Overview of School Finance in Arizona

Arizona school financing is based on a funding formula created in the early 1980s. The formula sets the limit on the amount of funds, or a maximum expenditure capacity, that is allowed for individual school districts based upon their student count. This count is weighted in the formula based upon district size, location, grade levels, and special-education categories. The weighted student count is used to develop the major parts of the maintenance and operation expenditure limits in a school district. Teacher salaries come from the maintenance and operations budget. Very small districts with fewer than 600 students are exempt from the expenditure limitations and isolated schools that are more than 30 miles away from any other school in another district receive additional funding.¹ A per-pupil amount is established and the districts receive that amount based on their average daily membership (ADM). The ADM “dipstick” counts are taken for budgeting purposes at the 40th and 100th day of the school year for the purposes of setting the budget for the following school year. The budget funding comes from state and local property taxes. Individual districts are responsible for local budgeting and

allocation to school sites and necessary district infrastructure. All budgets are approved by the local school board.

Individual school boards can access additional funding by going out to the voters for an override or bond election which is funded by local property tax levies. These funds allow districts to increase their budgets but require districts to specify to the public where the additional funding will be spent. Override and bond elections do not always pass. In fact, in November 2007, 17 out of 22 elections for school district issues in Maricopa County failed.² Some of the overrides were designated to keep previously supported programs in place. Since the voters can turn down the measures, districts must back out of previous commitments that were based on override funding. Often the cuts increase class size, eliminate special programs, or release teaching staff. When an override is successful, the district can fund the programs or strategies approved by the voters (e.g., reduction in class size, increasing teaching staff, implementing special programs).

School districts may budget more than the amount set by the funding formula for desegregation — the need for a district to establish equitable access to education for all students regardless of their area of residence — if they have an Office of Civil Rights administrative agreement or consent decree. The school district must prepare a separate budget detailing all expenditures. Nineteen school districts in Arizona have a desegregation budget in place.³

Until 1994, school districts could collect a secondary tax from their residents for capital expenditures. In 1994, Arizona's system of school capital finance was declared unconstitutional (*Roosevelt, et al. vs. State of Arizona*). The rationale for the decision was that the funding method failed to conform to the constitution's "general and uniform" clause

thereby causing disparities between school districts across the state with regard to the type of facilities and brick and mortar infrastructure that could be provided. Legislation, known as Students FIRST (Fair and Immediate Resources for Students Today), was passed which revised school capital finance and the way in which schools were built in Arizona.⁴ This legislation was not signed into law until 1998, four years after the former funding formula was found unconstitutional.

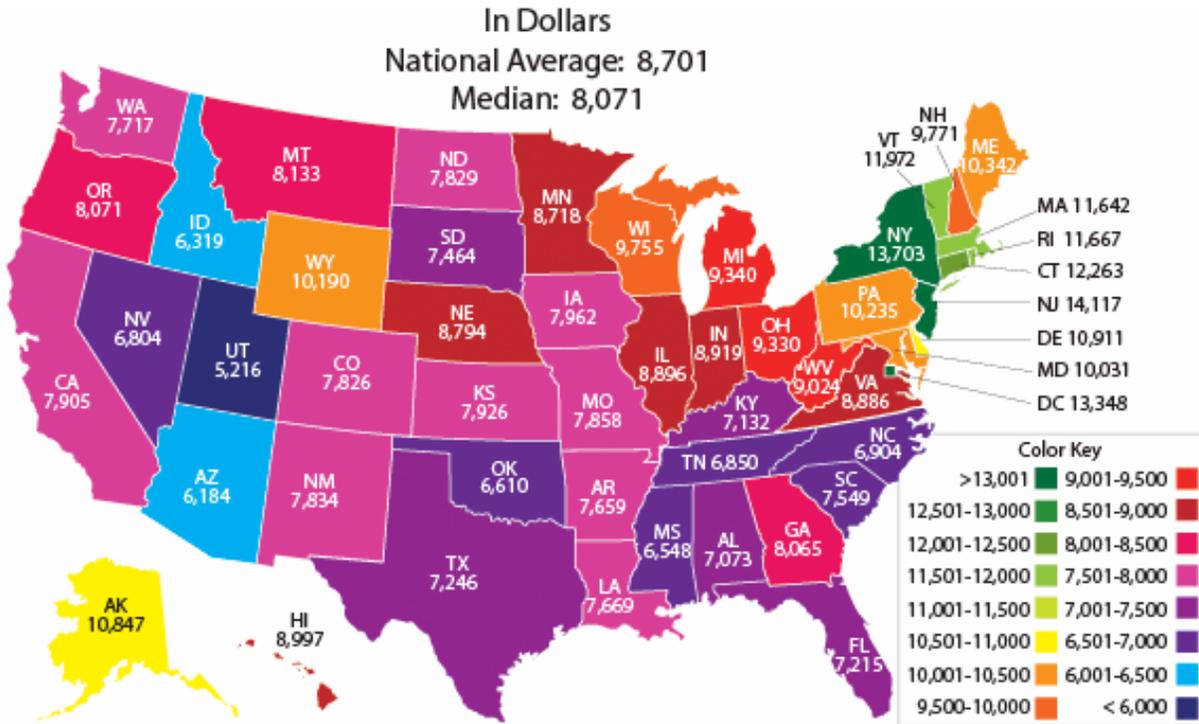
Arizona school finance is known as one of the most complicated financial structures in the country. The Arizona School Boards Association has set up a web-based calculator to assist in the layperson's understanding of how much money is available for the day-to-day operation of schools (see <http://www.azsba.org/admcalc.htm>).

Arizona historically has ranked very low relative to other states in per-pupil expenditures for education. This year was no exception. In the Quality Counts 2008 report, Arizona ranked 48th in per-pupil expenditures. It was interesting to note that the same report ranks Arizona high in the area of standards, assessment, and accountability. It is important to note that salary is dependent upon the cost of living in each state. Figure 4.1 illustrates per-pupil expenditure averages throughout the United States.

The Arizona Business and Education Coalition (ABEC)⁵ developed principles of agreement with regard to the Arizona General Fund Budget for education. Conclusions reached by this group recognized that:

- 1) Arizona K-12 education has historically suffered funding cutbacks.
- 2) Education and economic development are interdependent.
- 3) Policymakers, educators, and business leaders must hold each other jointly accountable for improvements in the financial and academic conditions of our schools.

Figure 4.1
United States Per-pupil Expenditure Averages



Source: Quality Counts 2008

ABEC recommended that levels of funding continue with growth and inflation factors in place and that full-day kindergarten be funded. They also made the important recommendation that the school finance formula be modified to allow school districts to adequately fund schools. Longer-range recommendations include determining adequacy of our educational system and a continued examination of the tax system as it relates to schools. The coalition believes that the tax structure should be equitable and should not place an undue burden on any community.

A recently released report from the Center on Reinventing Public Education at the University of Washington and funded by the Bill and Melinda Gates Foundation, focuses on

redesigning school finance.⁶ The center seeks to answer the question “How much money will it take for all students to meet standards and how should the money be spent?” The report is preliminary, with a promise of policy recommendations and conclusions to follow later in 2008. Several researchers are working on the many aspects of this problem. The researchers are unveiling promising alternatives to how public education now uses its money. Some of the studies indicate that funds should be spent on greater use of instructional technology, coaching for teachers, student assessment, instruction adapted to the learning styles of students, interventions for the most disadvantaged children, and incentive pay for teachers who utilize effective methods resulting in increased student learning. The report also discusses the importance of effective use of data for decision-making purposes. Further, the researchers are looking at ways to attract teachers. They suggest that current salary structures may prevent districts from offering special rewards for the most productive teachers or special incentives to fill teaching positions which require special skills or expertise. Some incentives may not be in the form of dollars in the paycheck. Working conditions, such as the physical appearance and availability of equipment at a school or the support of a good principal may be enough to attract some teachers to more high-needs schools.

Teacher Compensation

The major factor in school district budgets is teacher compensation. Districts must take the funds that are issued by the state, based on the previous year’s enrollment, and determine how much of the allocation will be paid out in salaries to teachers along with other employee groups in the schools. The Bureau of Education Statistics includes data in their files showing that there has been a 3.3 percent decrease in the average salary for teachers in Arizona when comparing 1989-90 to 2004-05 in constant 2005-06 dollars. Even so, Arizona ranks at the

lower end of teacher compensation as compared to other states. Within Arizona, starting teacher salaries vary based on the location of the school and the size of the school district. The starting salaries for new, inexperienced teachers this year in a sample of school districts in Arizona is illustrated in Table 4.1.

Table 4.1

School District	Location	Starting Teacher Salary 2007-2008
Alhambra School District	Phoenix	\$40,000
Amphitheater School District	Tucson	\$32,505
Dysart Unified School District	Surprise/El Mirage	\$36,059
Flagstaff Unified School District	Flagstaff	\$30,486
Gilbert Public Schools	Gilbert	\$35,280
Parker Unified School District	Parker	\$30,500
Phoenix Union HS District	Phoenix	\$36,947
Tempe School District	Tempe	\$33,152
Tucson Unified School District	Tucson	\$32,960
Wilcox Unified School District	Wilcox	\$30,056
Yuma Union HS District	Yuma	\$29,500

Note: Salary figures taken from the respective school district websites. Retrieved January, 2008.

Median salaries for teachers vary across the state. In Phoenix, the median salary is \$47,361, Tucson is \$44,558, and Flagstaff follows with a median salary of \$44,123.⁷ The cost of living varies throughout the state. Benefits packages vary from district to district. Most districts cover all or part of medical, dental, life, and vision insurance. The values of such packages vary (e.g., some districts offer \$4,274.60 and others \$2,795.50). Many school districts offer only very basic medical coverage with a high deductible before the employee

has to pick up additional cost of insurance. The Arizona State Retirement System is a benefit for all public school employees. Each employee pays in 9.1 percent of their gross salary per year and the district matches this contribution. Further, .50 percent is deducted from employees; pay after taxes for long-term disability insurance.⁸

In an effort to increase compensation for teachers, Arizona voters passed Proposition 301 in 2000. The law allows 20 percent of the funds to be spent on increasing teachers' base pay, 40 percent for performance pay for teachers, and 40 percent on a variety of expenses such as reducing class size, materials, computers, tutoring programs, and more. A 2002 study by the Morrison Institute found that schools spend 97 percent of what they receive from 301 funds on increasing teachers' salaries and benefits, indicating that only 3 percent is being spent on materials and computers, etc.⁹ Most districts are developing performance-pay plans with many districts distributing performance pay based on the accomplishment of school-wide goals. The funding is generated by an increase of six-tenths of one percent sales tax. Therefore, the fund is affected by the economic swings in spending by the consumers throughout the state. The fund was established for a 20-year cycle, ending in 2020.

The Costs of State Mandates

An additional cost of teaching is generated by mandates from the Arizona State Board of Education concerning instructional programs. Recently, for example, the state board added economics and an increase in math to the requirements for graduation from high school in Arizona. Such changes in the amount of required instruction potentially increase the cost of teaching to the extent that they required the hiring of more teachers to cover the needed sections. Many social studies teachers, for instance, would not be "highly qualified" to teach economics, so additional teachers typically would be needed. Moreover, there is a strong

possibility that few economics majors will be interested in becoming teachers, so recruitment will be challenging, adding additional costs.

Typically these mandates are not accompanied by a cost analysis or a state budget allocation. The current situation in regard to the state mandate to increase the number of hours devoted to English instruction for English-language learners in elementary schools is informative. To meet this need, the Arizona Department of Education (ADE) is asking districts to budget \$43,833 plus 25 percent in benefits for each teacher needed and to set aside a percent of other budgets to match the percentage of ELL students who need this mandated instruction. So, for example, if a district has 10 percent ELL students then it must set aside 10 percent of Title I and other budgets for this purpose. Extra state funds are promised for this purpose but do not exist and there are disagreements between the ADE and districts over the actual amount this mandate will cost.

The Costs of Being a Teacher

Districts support students in their pursuit of a free and appropriate education by providing books and basic supplies. Teachers often spend a great deal of their own money on classroom supplies for students. In addition, they often purchase supplemental materials and classroom resources for student use. Our current tax structure allows a teacher to deduct up to \$250 on their Arizona state taxes each year to assist in covering some of these expenses. However, most teachers spend more outfitting their classroom each year.

Teachers must obtain and maintain Arizona teacher certification. To do so, they must show evidence of the appropriate college degree and coursework, take the Arizona Educator Proficiency exam and pay fees to the state certification office. Every six years the certification is renewed. This requires the teacher to present the equivalent of 180 hours of recertification

credit or college transcripts indicating continuing education. Should a teacher take on the challenge of obtaining national board certification, there is a \$2,500 fee.

Required Teacher Expenditure	Amount
Fingerprinting to obtain certification	\$29
Fees to certification office	\$60
Fee for the AEPA	\$115
Fee for AEPA subject-knowledge test	\$70
Four years of undergraduate tuition (low estimate, 2006 dollars at a state university)	\$20,000
Four years of undergraduate books	\$2400
Recertification	
Renewal of finger-print clearance card	\$52
Fees for certification	\$60
Additional fees for endorsements in special areas	\$60 (per endorsement)

Working Conditions for Teachers — Infrastructure supports (e.g., technology, travel, materials, and tools)

In spring 2007, many Arizona teachers participated in a voluntary survey regarding working conditions at their schools. The survey addressed questions in five different categories (e.g., empowerment, leadership, professional development, time, facilities, and resources). The two areas which scored lowest were time and empowerment.

On the issue of time, 62 percent of responding teachers believe that their class sizes are too large, and 53 percent believe that they do not have enough time to collaborate with their colleagues. In addition, 39 percent responded that they spend 10 or more hours per week outside their regular day working on school-related tasks.

The survey report also indicates that teachers do not believe they have input in budget decisions and feel they have only a modest amount of input with school improvement planning. These are areas that could be addressed.

Teachers must manage discipline for students to maintain order and safety in the classroom. State law allows teachers to request that a student be removed from his or her classroom should disruptions become excessive and uncontrollable within normal parameters. The school administration plays an important role in these cases. Alternative settings for the student are provided by the principal so that the learning and safety of the children and the teacher in the classroom can continue uninterrupted. In some cases, the parents must be called in to remove the student from school for a suspension of some length. School districts have procedures in place which allow principals to suspend students for a certain amount of days. To increase the length of the suspension, the central administration typically provides guidance through hearings and other due-process procedures.

Cost of Teacher Preparation and Continuing Education

Teachers need a bachelor's degree in education or a bachelor's degree in another field with a post-baccalaureate degree in education in order to obtain certification. The cost of completing a four-year undergraduate degree in Arizona at one of the three public universities ranges from \$65,576 to \$68,576 including books, room, board, fees, transportation, and modest personal expenses. This cost is based on the spring 2008 tuition rates available on the universities' websites.

In order to maintain certification, teachers must accrue 180 clock hours or 12 college or university credits every six years. There are several ways to complete this requirement. Many districts provide recertification hours documentation for staff development that is offered on

the job for free. Many teachers need to return to a college or university for continuing education. Arizona State University tuition per credit hour is \$252, Northern Arizona University is \$260, and The University of Arizona tuition is \$327 per credit hour. All tuition rates listed here are before fees, books, or other materials. Courses are available online from a number of schools around the country. The credit hour costs vary widely. The University of Phoenix fee is \$612 per credit hour while Grand Canyon University is \$420 per credit hour. Courses can be found online from \$200 and up per hour. If a teacher attends a university or college for their recertification hours they could spend as much as \$3,900 or more every six years to maintain certification.

Recruitment and Retention as a Cost Factor

The Teacher Education Partnership Commissions (TEPC)¹⁰ convened a forum and focus-group sessions to focus on the challenges of recruiting teachers to Arizona and into teaching. The forum participants were educational leaders from around the state in both the K-12 sector and higher-education institutions. The partners include Arizona Board of Regents, Arizona Business and Education Coalition, Arizona Commission for Post Secondary Education, Arizona Department of Education, and Arizona Education Association, among many others. Their recommendations are shown in Table 4.2.

Perceptions vary regarding teacher recruitment. In some areas, there are enough qualified teachers applying for jobs. Shortages tend to persist in rural areas, in the content areas of math, science, and special education. Attracting professionals into hard-to-fill areas is a priority in many districts. Some offer recruitment stipends to sweeten the deal.

Table 4.2

Marketing and Recruitment
Increasing coordination and partnerships to improve the effectiveness of agencies, committees, and districts in planning between all groups and individuals to implement recruitment strategies.
Utilize professionals in the field to develop and support programs to locate new teachers under the aegis of a statewide leadership organization such as the Arizona Department of Education or the TEPC.
Increase community awareness, especially the business community, of the shortage of teachers and increase the involvement in the recruitment of teachers.
Strengthening the Pipeline
Pursue a statewide strategy seeking to expand the recruitment, preparation, and certification processes for new teachers exponentially, including early interest, degree completion, and alternative routes to teaching.
Pursue the development of a data program that tracks the movement of teachers throughout the educational system.
Role of Building Administrator
Examine the training and resources provided to building administrators who currently bear the major responsibility for interviewing and hiring teachers.
Teacher Compensation
Ensure a statewide salary level which is sufficient to recruit “high quality” teachers and permit all schools to be competitive in the local labor market.
Use incentives to encourage entry or retention in the profession, carefully measuring their effectiveness and avoiding excessive front-loading.
Expanding the Recruitment Pool: Alternative Routes to Teacher Certification
Encourage and support alternative routes to teacher certification
Recruit Former and Retired Teachers Back to the Classroom
Pursue teachers who have left the profession to increase the quality of the candidate pool.
Recruiting and the Societal Perception of Teachers
Continue to increase efforts to enhance the image of those who are teaching in the schools.

Source: The Teacher Education and Partnership Commission (2007) *The Quality Teacher Crisis: Arizona’s Response*.

National projections indicate that Arizona school enrollment is expected to increase by 28.1 percent between 2004 and 2016. Only Nevada and Utah have higher growth projections. If this prediction holds true, the recruitment of teachers is a necessity.

Data on the costs to school districts for teacher recruitment is not readily available. Most districts, it appears, absorb such costs into daily operations budgets and do not keep separate records of recruitment costs. Such costs, however, are likely to be significant. Amphitheater School District in Tucson, for example, estimates recruitment expenses of \$36,000, mostly for advertising. In all likelihood, this figure underestimates the actual costs of teacher recruitment.

Differential Compensation Strategies

Overall, teachers have been paid on a set salary schedule with increases based on years of service and number of college credits. Over the past 20 years, various differentiated pay structures for teachers have been attempted. Arizona Career Ladder is one of the most long-standing performance pay structures in the country. Other states are embroiled in attempts at pay structures which compensate teachers based on their students' test scores, skills, and other additional duties. Some districts are paying hard-to-fill stipends to teachers who take on assignments which are more difficult or positions which have few applicants. Those positions tend to be in special education, math, and science areas.

There are various forms of differential pay for educators. Career Ladder, hard-to-fill stipends, knowledge and skills-based pay, and performance pay are the types most commonly implemented.

Career Ladder

Career Ladder programs provide teachers with a professional path which includes expansion of instructional skills, a focus on increasing student achievement, and offers additional professional opportunities for teachers including mentoring, providing staff development for other teachers, serving in various leadership roles, and more. The pay stipend increases based on accomplishment of the requirements at each step of the ladder or successful maintenance at the higher steps.

The Career Ladder program began in 1984 with the opportunity for all Arizona school districts to apply to the state for planning grants to design a performance-based pay program for teachers. In 1985, the Arizona Legislature created the Arizona Career Ladder program as a five-year pilot in which seven districts in the state participated. Upon conclusion of the pilot, the program received permanent legislative status and was expanded to seven additional districts. Two years later (in 1992), the legislature expanded the program to eight additional districts. There now are 28 districts (out of the 237 districts in the state) that are funded for the Career Ladder program. These are the initial 28 districts that signed on to the program in 1992.

In 1993, the legislature shifted the funding responsibility from the state to local districts and did not allow for expansion. In 1994, the legislature passed measures which froze the local district contribution to one-third of the costs. In addition, the law provided for schools to develop incentive programs for whole schools, teams, or whole districts. Governor Janet Napolitano has mentioned the program in her “State of the State” address as a way to improve student achievement and develop and retain teachers. She states, “The good news is that we have a very limited but highly successful program called Career Ladder that has been providing professional development in 28 Arizona school districts with great results for more

than a decade ... it provides professional development, evaluates teacher performance, and rewards teachers for success with increases in pay.” Another long-overdue expansion could be forthcoming; however, state budget limitations and shortfalls may not allow expansion and may even cause the legislature to consider reducing or eliminating the program.

The 28 districts in Arizona have implemented and maintained a Career Ladder pay-for-performance system for nearly 20 years. Each district designed a plan which met the requirements of the law and the needs of their district. Modifications to the programs are made as needed and submitted to the legislature annually at the time of renewal. The law is overseen entirely by the legislature and not by the ADE. The legislature is firm in its review of the programs and has been firm in holding back from program expansion.

The most recent evaluation of the effects of the Arizona Career Ladder program on student achievement indicated that “... the overall results indicate, that on average, students in Career Ladder schools are performing significantly better on AIMS measures than did students in non-Career Ladder schools, even after adjusting for differences in student and school characteristics.”¹¹ One school district has recently filed suit against the state due to their lack of access to Career Ladder funding, citing inequities between schools who do and those who do not have this funding.¹²

Differential Pay for Areas of Need

Many would argue that there is a general need to offer wage premiums to teachers who are willing and able to teach in schools in areas of poverty. The students from lower-income families tend to score lower on tests of academic achievement, and, sadly, they tend to have the least-qualified and least-experienced teachers at the helm. A second area of need is in certain subject areas. The areas of most concern are science, math, and special education.

Shortages also are noted in Arizona for teachers of the gifted and those who are certified to teach English-language learners.

If a pay differential is considered, the dollar figure needs to be significant enough to attract teachers to the positions. Wage premiums of at least \$5,000 to \$6,000 over state averages are needed to be effective in attracting teachers to schools in areas of poverty and to positions that are hardest to fill.¹³ The total costs of this type of plan depend, therefore, on how many teachers were needed in these key areas and how much districts were willing to spend on recruitment stipends for those areas. The payment of recruitment stipends also could create salary compression within targeted departments as the balance between starting and existing teachers' salaries is altered.

School boards have the authority to designate positions as "hard-to-fill" and offer stipends for those positions. School superintendents work with administration and local teachers' associations in order to initiate such programs.

Skills and Knowledge-Based Pay

Skills and knowledge-based-pay focuses on compensating teachers for instructional expertise and practice. Some districts choose to give raises to teachers who complete certain professional development activities or for obtaining national board certification. As of 2005, of the 54 school districts in Arizona that had a national board certified teacher on staff, 32 gave some sort of financial recognition to teachers who achieved this certification status.¹⁴

Performance-Based Pay

Performance-based pay is linked to student achievement or student results. Most successful performance-based pay structures are based on the results of an entire school and teachers at that school are paid a bonus as a team.¹⁵ Some districts around the country are

experimenting with paying for the performance at the individual teacher level. Most performance-pay structures rely on standardized achievement tests to measure progress. While necessary and informative, this single approach to determining the learning of students in a particular class can be problematic. The tests tend to focus on only a part of what students are required to learn.

The Rodel Foundation, in partnership with the Greater Phoenix Leadership, commissioned a study in 2004 which led to several conclusions regarding Arizona's education system. The reported findings are that Arizona must "Lead with Five."¹⁶ The five are classroom-based strategies that have proven to be effective throughout the country. They are:

1. Providing full-day kindergarten for all students.
2. Preparing and recognizing teachers for high performance.
3. Creating smaller schools.
4. Reducing class size in K-3.
5. Providing one-on-one tutoring and extra help for struggling students.

The report also clearly states that these strategies alone will not work. "First, all existing instructional resources must be deployed toward the five proven strategies that increase student performance. And second, Arizona must face up to the issue of putting more money into schools." The report goes on to say that it would cost an additional \$1,883 per student, bringing the average per-pupil expenditure from \$5,745 to \$7,628 (in 2005 dollars).

Private Sector Comparisons

In the private sector and business world, performance incentives are commonplace. Incentive options fall into three major categories; individual, group, and enterprise.¹⁷ Individual incentive plans include piecework, bonuses, merit pay, lump-sum merit pay, incentive awards, sales incentives, incentives for professional employees, and executive

compensation. Group performance incentives reward teams or groups of individuals within a company for accomplishing a goal or task more efficiently or more quickly. Enterprise incentives allow employee stock-ownership plans, stock options, and profit sharing. These types of incentive programs can be found within most contracts with major employers such as Kraft Foods, Raytheon, etc.

Suggestions for Best Practice — Research Findings from Teacher Compensation Reform Initiatives

According to Odden, one of the premier researchers in the area of teacher compensation, the following objectives must be met in order to reform teacher compensation over the next few years:

Objective 1. Identify an overall average teacher salary level which will allow states, districts, or schools to compete for talent in the larger labor market.

Objective 2. Identify the higher salary levels that will be needed to enable urban and geographically isolated rural districts to fill positions; do the same for areas of high-poverty and low-performing schools.

Objective 3. Set clear, ambitious, and attainable student-achievement goals for improved student performance on an individual and schoolwide basis. Set aligned targets for the major student sub groups (e.g., lower-income backgrounds, English-language learners, disabilities) and incorporate these targets into an element of teacher compensation.

Objective 4. Identify an instructional vision that can serve as a focus for teacher professional development and a target for enhancing teacher professional practice. Develop a performance-assessment system that measures teacher's instructional practice.¹⁸

Teacher Incentive Fund Grant

The United States Department of Education has put forth an effort to experiment with alternative pay structures for teachers.¹⁹ Two grant award cycles were offered within the past two years. The grant requires grantees to design and implement performance-based pay structures for both teachers and principals. The first grant cycle awarded 16 grants to districts and state departments. The second grant cycle awarded an additional 18 educational districts or state departments substantial sums of money to develop their programs. The grant goals are to improve student achievement by increasing teacher and principal effectiveness; reform teacher and principal compensation systems so that teachers and principals are rewarded for increases in student achievement; increase the number of effective teachers teaching poor, minority, and disadvantaged students in hard-to-staff subjects; and create sustainable performance-based compensation systems.

One of the Teacher Incentive Fund grants was awarded to Amphitheater Unified School District in Tucson. The district is in the first year of a five-year grant cycle. The first part of the 2007-08 school year was allocated to planning and development. The project, which was put into place in January 2008, involves knowledge- and skills-based pay for instructional skills and professional development, awards educators for taking on additional leadership opportunities in schools, and rewards teachers for student achievement both school-wide and individually. The implementation is in higher-poverty areas with the aim of retaining and attracting teachers to those schools.

Potential Hurdles to Instituting Performance-Based Pay Structures

Instituting performance-based pay structures of any type does not come without some difficulty. Although research has shown that there is no relationship between teacher

university education level and student achievement, and very little correlation between teacher experience and student results,²⁰ traditional salary schedules persist. The problem is, if those criteria do not indicate there will be a good result for students, what criteria should be used? In order to determine the amount of compensation which should be offered for a base-salary schedule or for a pay-for-performance schedule, criteria needs to be agreed upon by the stakeholders and research on what works must be implemented.

In Milanowski's Cincinnati Public Schools study, a "high quality" teacher-assessment system identified teachers who were getting better results with students thereby justifying the use of a pay-for-performance system for those teachers.²¹ In another study Schacter and Thum found that "... teachers who score well when evaluated against our teaching standards and rubrics produce vastly higher-achieving students than other popular reforms such as class-size reduction, computer-based instruction, charter schools, school choice, and virtually every comprehensive school reform model implemented to date."²² They concluded that quality teaching produced a 0.91 standard deviation gain in student achievement. The hurdle to jump here is implementation of a new evaluation system for teachers. Retraining administrators and other evaluators on a new system and providing professional development for teachers is a lengthy process.

The State of Florida experienced difficulties with their E-Comp program. After the board approved the program, the districts and teachers strongly opposed the plan. Official complaints were filed against the board and teachers unrelentingly protested to the education commissioner. There were several lessons learned in Florida. There was a lack of stakeholder involvement in the design of the system and an overreliance on the single measure of test scores to judge teacher performance. Further, the state had decided to reward only 10 percent

of the teachers, which was immediately touted as unfair. Finally, districts were only given four months to prepare a plan, negotiate with unions, and submit it for approval. The timeline was far too short.²³ (Center for Educator Compensation Reform, 2008).

Union opposition of many pay-for-performance plans has led to difficulties with implementation. The objections include a belief that performance pay will be detrimental to school culture, a belief that the systems are not fair, technical aspects of data regarding student achievement are not understood, and lack of teacher input into the plans. However, there may be a partial shift in opinion by the union leadership. In Tennessee and Denver the teachers' unions are working very closely on the design of the new systems with success. Both the National Education Association and the American Federation of Teachers tend to support additional pay for teachers who work in high-needs schools. They both caution against overreliance on test scores to determine bonuses.

Guidance for Implementation of Differentiated Pay Systems

In 2007 the National Institute for Excellence in Teaching created the Working Group on Teacher Quality. Their charge is to build consensus among organizations and a field of experts on the issue of performance pay and compensation reform. The group outlined four critical design elements to sustain performance-based pay systems: ongoing job-embedded professional development, performance-based compensation, evaluation based on professional standards, and career advancement opportunities. Many different types of performance-pay systems have been implemented and studied. To draw from those successes and failures the National Institute for Excellence in Teaching has six implementation recommendations for organizations that propose to create such programs:

1. Sufficient and stable funding
2. Communication and teacher buy-in

3. Skilled leadership
4. Target high-need schools and subjects
5. Include a program evaluation and monitoring system
6. Integrate and align other systems to compensation system

Summary

Arizona school finance is complex, with many aspects and factors that have been added throughout time. The school-finance structure has direct bearing on teacher compensation. Arizona ranks low in comparison to other states on per-pupil spending and teacher compensation. Increases in student population in our state will push the demand for teachers upward, potentially requiring additional incentives for recruitment and retention, particularly in high-needs areas.

There is a need to target our available funds for public education toward those strategies that are proven effective. One strategy directly related to the cost of teaching may be the use of differentiated pay structures which provide additional compensation for teachers who obtain good results and are effective in day-to-day classroom and professional practices. Differential pay-structure development requires input from all stakeholders and strong leadership throughout the system due to the volatility of the implementation. While there is a great deal of work needed, several organizations and research institutions are working diligently to generate needed information for such changes. States that are interested in performance-pay strategies should address the equity and fairness of funding adequate base-pay structures to which differential pay can be added.

Chapter 5

Early Childhood Education and Care in Arizona

Naomi Karp

Background

For decades, American education has focused its resources, personnel, and energies on K-12 education. However, for the past dozen years, early childhood education and care (ECEC) issues and policies have moved into the traditional K-12 system. This change has occurred for several reasons, some of which include:

1. Public awareness about research on early brain development has raised expectations as to what children from birth through age 5 can learn and accomplish.
2. National and state leaders have focused on early literacy foundations as a way to raise the stagnant reading scores of American students.
3. Education administrators and policymakers continue to be frustrated by not being able to close the achievement gap.
4. Economic studies indicate that the return on early childhood programs, especially those that target poor children, far exceed the return from other economic development efforts.¹ According to Nobel Laureate Economist James J. Heckman, Ph.D.,

“Investments in high-quality childcare and early childhood education do more than pay significant returns to children — our future citizens. They also benefit taxpayers and enhance economic vitality. Economic research studies in dozens of states and counties, and in longitudinal studies spanning 40 years demonstrate that the return on public investment in high-quality early childhood education is substantial.”²

Yet, with all the interest shown and the involvement of high-level politicians, educators, researchers, and parents, accessibility to high quality, affordable programs that will benefit all young children is not consistent across states. Moreover, the public and parents often are confused as to what is even meant by early childhood education and care.³

Early childhood typically refers to children from birth through age 8. The phrase “early childhood education and care (ECEC)” has multiple meanings in Arizona as well as across the nation. Typically, ECEC is offered to families whose children may range in age from infancy through age 6. Approximately 577,000 Arizona children are younger than age 6, according to 2005 data analyzed by Kids Count.⁴ About 55 percent of these children have parents in the workforce.⁵

Thus, these children require some type of early childhood education and care services, which may be known as childcare, preschool, early education, or prekindergarten. Some young children may go to an early education program in a center or they may go to a friend’s, relative’s, or a neighbor’s home for a portion of the day. Others may attend an Early Head Start program, a Head Start program, or public school prekindergarten classes so that they have adult care while their parents are working. Early childhood education and care programs also serve young children who do not have both parents in the workforce, but these parents want their children to have learning and socializing experiences in group settings.

Parents may be required to pay if their children attend privately run for-profit or nonprofit programs. Some programs such as Head Start or prekindergarten classes are publicly funded and do not charge. In Arizona, families pay an average yearly cost of \$5,876 for center-based childcare for a 4-year-old.⁶

The various types of programs may operate for a few hours each day or for a full day. They vary greatly in terms of funding and, perhaps most important, in the qualifications and credentials of the adults who spend their days with the children. Teacher education is one of the factors that impacts the quality of programs, and program quality greatly affects children's outcomes, especially the outcomes of poor children.⁷

In Arizona, ECEC is fraught with problems. Many of the policies and regulations that affect early childhood education and care do not support high-quality programming needed for good learning and development. The delivery of early childhood education and care in Arizona is complicated by the state's demographics, systemic policy deficits, a lack of rigorous standards for many of those who teach in early childhood education and care settings typically not affiliated with public schools, a hodgepodge of programs, and patchwork funding, some of which comes from the state and some from the federal government.

This chapter includes a discussion of the following issues and how they impact early childhood education and care in Arizona:

1. Key research findings related to brain development and child development and how enriched early childhood experiences lay the foundations for later learning
2. The importance of high quality early childhood environments
3. Demographic portrait of the state's young children
4. The early childhood workforce
5. Types of early childhood programs
6. Summary and Policy Implications

Research on Early Childhood Education and Care and Later Learning

Early brain research tells us the following things relevant to young children's development and learning:

1. Young children's experiences and opportunities before age 3 years play a critical role in shaping the actual structure of the brain. This affects children's abilities and behaviors from early childhood through adulthood.⁸
2. The connections for learning, or synapses, in a baby's brain grow extraordinarily fast in the first years of life. The more frequently a baby hears sounds and language, sees pictures and colorful objects, and is cuddled and loved, the stronger these connections become. These experiences establish linguistic, social, and intellectual foundations for learning and behaving.
Without these experiences, the synapses do not grow. The foundations for speech, language, social, and cognitive development are not put in place. Children who lack experiences that stimulate synaptic growth are at risk for failure in school.⁹
3. A baby's sound-language system starts to develop the instant that baby draws its first breath. In order for a child to learn to talk and eventually to read, adults must provide experiences and opportunities that build speech, language, and vocabulary.¹⁰

Risley and Hart compared the language development of children in families on welfare, working-class families, and professional families. A 4-year-old in a family on welfare heard about 13 million spoken words; a child from a working-class family heard an average of 26 million words; and a 4-year-old from a professional family heard 45 million words. These differences affected vocabulary development through fourth grade.¹¹ Vocabulary size affects both reading fluency and comprehension, making a difference in how well a child reads.

Furthermore, child development research tells us that parents, caregivers, and teachers promote young children's lifelong learning, healthy development, and success in school by providing ongoing experiences and opportunities that build on and expand a young child's speech and language, motor, and cognitive abilities.¹²

In addition, research confirms that when young children — across social classes — come to kindergarten knowing the ABCs and the sounds of at least some of the letters, how to hold a book correctly, and the names of colors and shapes, they typically will learn to read quickly and do well in school.¹³ However, many young children from poor families lack the opportunities and experiences that will prepare them to succeed in school and beyond. This lack of opportunities and experiences is compounded by the fact that many of Arizona’s childcare providers lack the education that prepares them to provide the enriched activities that build the skills needed for children to succeed in school and beyond.

The Importance of High-Quality ECEC Programs

Some of the most important research in early childhood education and care focuses on the quality of the environment where young children spend their days and how that quality impacts learning and development. It is understood that early childhood settings should always guarantee the basic components that provide a safe physical environment, good nutrition, and the protection of children’s health.

Beyond that, studies confirm that high-quality early education settings make a difference for young children, particularly poor children. High-quality programs yield short- and long-term gains in school achievement and success into young adulthood. The Perry Preschool Project in Michigan and the Abecedarian Project in North Carolina clearly document the long-term gains that the children attending those programs made and continue to maintain as adults.¹⁴

A synthesis of research studies confirmed that poor children are harmed more by poor-quality programs and benefit more from high-quality programs than children from upper- and

middle-income families. The fact is, however, that most poor children attend programs of such low quality that their learning and development are actually jeopardized.¹⁵

“Eager to Learn: Educating Our Preschoolers” (2000)¹⁵, a study conducted by the National Research Council, has identified the key features of high-quality programs that make a difference in young children’s success. High-quality programs:

1. Provide warm, responsive teachers who are sensitive to each child’s strengths and needs, form warm, secure relationships with each child, and nurture each child’s emerging abilities. This is the key ingredient of high-quality programs and points to the “centrality of teacher education and preparation.”(p. 7).
2. Ensure teachers have ongoing professional development, which is related to the quality of the program, and program quality predicts developmental outcomes of children. Formal early childhood education and training correlate highly with positive teacher and caregiver behaviors. A strong link exists between a teacher’s appropriate classroom behaviors and the number of years of training and education she or he has received.
3. Provide teachers with high-quality supervision, time to reflect on their interactions with children and their own classroom behaviors, and time to revise and plan their teaching.
4. Have low turnover rates among the staff, reducing the amount of disruptions in adult-child relationships and classroom routines.
5. Engage children daily in mutually supportive and complementary activities that build and nurture cognitive, social-emotional, physical, and motor development. Activities are designed to address the development of the whole child, across developmental domains.
6. Have integrated, specified, well-planned goals that afford children opportunities to develop reasoning, language, and social skills in large and small groups, and in individual sessions with an adult.

7. Offer small class size and low child-adult ratios, both of which are associated with more opportunities for teachers to expand children's language skills, encourage and support problem-solving and exploration, and mediate social interactions. These features also result in teachers who spend less time controlling and restricting children.
8. Implement a well-planned curriculum or pedagogical approach across developmental domains in order to help children learn more complex skills, build a rich vocabulary and literacy competencies, and acquire mental strategies such as reasoning, categorizing, and metacognitive competencies.
9. Engage and support families in positive and responsive ways. Teachers frequently make home visits and encourage parents to be active participants in classroom and program activities.

The Cost, Quality, and Outcomes study of 401 childcare centers in California, Connecticut, Colorado, and North Carolina found that “the quality of children’s experiences in typical childcare centers affects their development while they are in childcare and their readiness for school. Children who attended higher-quality childcare centers performed better on measures of both cognitive skills (e.g., math and language abilities) and social skills (e.g., interactions with peers, problem behaviors) in childcare and through the transition into school. Further, this influence of childcare quality was important for children from a wide range of family backgrounds.”¹⁶

To reiterate what Bowman, et al. found: The children who need high-quality programs the most have the least access to it. The poorest children’s early development and learning are actually jeopardized because they attend such low-quality programs. This is true for many of Arizona’s children.¹⁵

Demographic Portrait of Arizona’s Young Children

According to a recent report, “Building Bright Futures,” in Arizona almost one in four children who are age 5 and under lives in poverty. Sixty percent of Arizona’s families live just above the poverty level, but they earn too much to receive any type of public assistance. They cannot afford high-quality ECEC or health care.¹⁷ The 2000 U.S. Census found that almost 8 percent of our children live in “severely distressed” neighborhoods; 10.9 percent of Tucson’s children live in severely distressed neighborhoods, ranking Tucson among the 100 metropolitan areas with the most severely distressed neighborhoods.¹⁸

“Building Bright Futures”¹⁷ reported the following facts about Arizona’s children and their families: There are approximately 577,000 children age 6 in Arizona, and that is 35 percent of the total child population. Twenty-two percent, or about 127,000 of the children, have parents who are immigrants, but 93 percent of the children were born here. Of the 127,000 children, 77 percent have families who speak Spanish as their primary language, 6 percent speak an Asian or Pacific Island language, 7 percent speak an Indo-European language, and 10 percent speak some other language. There are approximately 37,500 Native American families with 21,200 young children in Arizona. Eighteen percent of those families describe themselves as “linguistically isolated.”

Arizona does not have a mechanism for systematically providing diverse families of young children with information and resources related to the availability of ECEC, child development, and parenting education. Arizona also does not have the capacity to provide all families, especially those in rural areas, with state-of-the-art information about early literacy and language development.¹⁷ Thus, parents remain unaware of research-based activities that can help them prepare their young children to be successful in school.

In 2005, approximately 30,400 young children lived with a grandparent as the main caregiver. In these circumstances, the grandparent tends to be poor or may have a disability that limits interactions with the child.¹⁷ This impedes opportunities and experiences needed for healthy learning and development.

Arizona has one of the nation's highest school dropout rates. Forty-two percent of Arizona's children live in neighborhoods with high rates of school dropouts. The national average is 25 percent. Children who live in this type of neighborhood tend to be poor students and leave school early. Young children tend to have a limited amount of contact with older children who value education.¹⁸

Arizona does not have a school-readiness indicator system in place. There are virtually no comprehensive, common data across agencies that provide a picture of what Arizona's children look like when they enter kindergarten. Thus, it is difficult to make in-state and national comparisons of children's strengths and needs. It is even more difficult to plan appropriately for the types of programs and other services children will need when they enter school.

Professional Development in Arizona

Early childhood teacher education, or professional development, is complex. The early childhood workforce in Arizona ranges from people with high school diplomas or less to those who have bachelor's degrees or higher. The providers also may be grandparents or other relatives, teachers in a childcare center, or teachers in a public school. In addition, different early childhood settings require teachers to have different qualifications and credentials. These requirements may be mandated by the Department of Health Services or the Department of Education.

Research indicates that the quality of an early childhood education and care program is dependent on the educational levels and experience of the classroom teachers.⁷ Despite this, many Arizona teachers lack the education and experiences needed to prepare children to be successful in kindergarten and beyond. In order to meet the minimum licensing level set by the Arizona Department of Health, a teacher must be 18 years old, have a high school diploma or the equivalent, and have six months experience in providing childcare.¹⁹

According to “Building Bright Futures,”¹⁷ 68 percent of the state’s ECEC teachers do not hold a college degree. The report also indicates that 31 percent hold only a high school diploma or less. Further complicating things, teachers who report that they hold a bachelor’s degree may not have a degree in early childhood education. Current data collection methods do not indicate specialized areas.

An endorsement in early childhood education is issued by the Arizona Department of Education (ADE) to those teachers who hold Arizona certification in elementary or special education. The endorsement requires 21 hours of coursework in the content areas, a minimum of eight hours in a student-teaching practicum, and a passing score on an assessment of the early childhood subject knowledge portion of the state proficiency test.²⁰

In December 2004, the Arizona State Board of Education approved the creation of an early childhood education certificate and an early childhood education endorsement to provide improved professional development and teacher preparation program for Arizona educators who will provide services primarily in preschool and kindergarten programs. The early childhood certificate and endorsement became available in September 2005, and all teachers in public schools serving children birth through kindergarten must have the certificate or endorsement by July 1, 2009. Public school early childhood education programs include, but

are not limited to: half-day and full-day kindergarten programs, early childhood block-grant programs (for children who qualify for free or reduced lunches), family literacy programs for preschool children, and public school-administered early childhood education programs funded in whole or part with federal funds (such as the Head Start programs) provided nothing in the endorsement or certification conflicts with the terms of the federal grant. Extended-day childcare programs provided by local educational agencies are not considered early childhood education programs unless the program meets the definition of a public school early education program. The early childhood certificate or endorsement are optional, but recommended, for individuals teaching in public schools grades first through third.

Early education teachers, as with all educators in the state, are held to the Arizona Professional Teacher Standards and must meet minimum requirements for certification in the area or age level in which they intend to teach. A provisional early childhood education birth through age 8 certificate is valid for two years and is not renewable, although it may be extended once for two years. Minimum requirements include a bachelor's or more advanced degree from an accredited institution, a passing score on both the early childhood professional knowledge and subject knowledge portion of the Arizona Educator Proficiency Assessment (AEPA) and one of the following three options:

- a) Completion of a teacher-preparation program in early childhood education from an accredited institution or a board-approved teacher preparation program.
- b) A valid early childhood education certificate from another state.
- c) Thirty-seven (37) semester hours of early childhood education courses from an accredited institution to include prescribed areas of study and a minimum of eight semester hours of practicum. Those practicum hours must include four semester-hours in a setting servicing children age birth through preschool, and an additional

four semester-hours serving children in kindergarten through grade 3. One year of verified full-time teaching experience with young children through grade 3 may substitute for a single four semester-hour portion of practicum.

Early childhood teacher education courses, as specified in the certification and endorsement criteria, shall include all of the following areas of study:

- 1) Foundations of early childhood education.
- 2) Child guidance and classroom management.
- 3) Characteristics and quality practices for typical and atypical behaviors of young children.
- 4) Child growth and development, including, health, safety, and nutrition.
- 5) Child, family, cultural, and community relationships.
- 6) Developmentally appropriate instructional methodologies for teaching language, math, science, social studies, and the arts.
- 7) Early language and literacy development.
- 8) Assessing, monitoring, and reporting the progress of young children.

A college course or appropriate examination also is required for the Arizona and the U.S. Constitutions. Candidates who are deficient in the Arizona or U.S. Constitution requirement have three years under a valid teaching certificate to fulfill the requirement. The standard early childhood education certificate is awarded to teachers who qualify for and hold the provisional early childhood education certificate for two years and either have two years of verified full-time teaching experience with children birth through age 8 or hold current national board certification in early childhood. The standard certificate is valid for six years and may be renewed.

Because the certification and endorsement requirements are not yet fully in effect in Arizona, it is difficult to ascertain what impact this initiative might have on the recruitment, support, and retention of these teachers in the field. As of 2007, the ADE had only approved four teacher-preparation programs in the state, severely limiting access to coursework needed for teacher certification. Recruitment might be an issue when all teachers of students birth through kindergarten are required to meet certification criteria to continue teaching at that level. Depending on how many teachers choose to stay and earn the necessary endorsement, efforts may need to be made to seek more new teachers for this population. Teachers at the early childhood education level also may need specialized support appropriate to the ages of students served. Finally, data are not available for how and if we can retain early childhood teachers once they begin a teacher-education program or begin their teaching career in schools.

In addition to ECEC teachers, there are two other types of staff members in ECEC: assistant teachers and directors. Assistant teachers typically have only a high school diploma or less yet they have classroom responsibilities that are not that different from the classroom teachers. In Arizona, 56 percent of the assistant teachers have a high school diploma or less.¹⁷

Thirty-four percent of the directors of programs have less than a four-year college education but may have an associate's degree; 58 percent have a four-year degree. The directors have the responsibility of supervising and training teachers but typically lack the education level, knowledge, and experiences that will maximize the teachers' understanding of the importance of high-quality and how to provide it. In Arizona, early childhood education and care teachers earn salaries that place them at the federal poverty level for a family of four.

¹⁷This makes it difficult to recruit, hire, and keep highly educated teachers. Staff turnover rates are high, program quality decreases, and children are in jeopardy.

Those teachers who want to enter professional development programs have several options provided through community-based agencies, community colleges, or the state's university system and private institutions. However, there is not a uniform data collection system that provides information about the numbers of participants, courses taken, and other data that would inform policymakers about program effectiveness and outcomes.

Arizona has many holes in professional development activities for the early childhood education and care workforce. According to "Building Bright Futures," the shortcomings include:

1. Lack of competency-based standards in the licensing regulations for the education and training of ECEC personnel. The result of this void is that the majority of ECEC teachers have little education or actual experience in the field. These adults are responsible for young children's learning and development yet they lack the skills and knowledge required in high-quality settings.
2. Community college courses and universities' courses do not articulate smoothly, making it difficult for students to achieve certification or a degree. Many in ECEC work full-time or are nontraditional students who require innovative and creative programs. Because these two systems of higher education do not fit together, Arizona might be facing a shortage of qualified professionals for ECEC as of July 2009, when the early childhood certificate requirements begin.
3. There are limited resources in the state that can be used to help raise wages for ECEC personnel. In addition, Department of Economic Security (DES) subsidies that help to pay the costs of care in centers enrolling children whose families receive DES assistance, are below the market rate. There also are limited resources to use as incentives for hiring and retaining well-qualified staff. Without increased state funding or an incentive program to encourage programs to pay higher salaries, ECEC teachers will continue to work for federal poverty level wages, forcing many to leave the field.

4. Arizona lacks a system for meeting the training and learning needs that will meet the needs of the diverse workforce, their prior educational experiences, and their educational goals. Currently, ECEC providers care for children in a wide range of settings. There are striking differences between urban and rural needs or home-based care versus center-based care. These and other differences require flexible, creative, and innovative education systems and programs that will truly meet the diverse needs of today's workforce.

Arizona does not have a comprehensive statewide system in place to collect and analyze data regarding wages and educational levels of all ECEC personnel. Without this type of system, the state's institutions of higher education, public schools, and ECEC professionals cannot adequately and appropriately plan high-quality professional development programs.²⁰

According to the ADE, it appears as if there is a shortage of early childhood special-education teachers and early childhood education teachers.²¹ They are in the classrooms, but they are there with emergency and provisional certificates.

The department has issued 199 emergency and provisional certificates in early childhood special education. It also has issued 376 emergency and provisional certificates in early childhood education. Because there have been so many emergency certificates issued in early childhood special education, the ADE is collecting data to identify the barriers to certification.²¹

ADE has issued 495 standard early childhood special-education certificates and 30 standard early childhood education certificates. In addition, there are 11,279 endorsements in early childhood education. The ADE staff believe this high number may include many K-3rd-grade teachers who are required to have the early childhood education certificate or endorsement by July 2009.

Thus, professional development in Arizona is fragmented, not always accessible to the workforce, and far from state-of-the art. The education levels of the personnel in the classrooms with young children are low, running counter to research that says well-prepared teachers are a key ingredient in high-quality programs, which impact young children's outcomes.

A high-quality early childhood teacher should be well-versed in child development, social-emotional development, early literacy and numeracy, music, art, classroom arrangement, and a myriad of things that delight young children, help them learn self-regulation, and build the competencies and behaviors that lead to success in school. The state does not have a professional development system that will educate the number of high-quality teachers needed to prepare young children to be successful in school and beyond.

Early Childhood Education and Care Programs in Arizona

Arizona provides families with young children an array of early childhood education and care options. These options include: education and childcare provided by a friend, neighbor, or relative in their homes; center-based education and care, or prekindergarten classes for 4-year-olds supported by public schools. In addition, Head Start is available for 3- and 4-year-olds whose families meet the financial guidelines, and Early Head Start is available for infants and toddlers whose families meet the criteria. About 17,000 children attended Head Start programs in Arizona in 2006-2007. The data are not clear as to how many are eligible. The state puts no money into Head Start.

Rarely are these ECEC options considered to be "high quality." Only 15 percent of Arizona's licensed childcare centers are accredited by the National Association for the Education of Young Children (NAEYC). The program accreditation standards developed by

NAEYC are research-based, rigorous, and considered the gold standard for measuring the quality of an ECEC program.

Arizona lacks a comprehensive, cross-agency data collection system that can provide accurate data regarding the numbers of children served by programs, the numbers eligible, and other information needed to efficiently plan for services and personnel to deliver them.²¹ For example, the Arizona Department of Education indicated that it does not track either the total number of preschool classrooms or total number of preschool teachers in the state.²²

Several states, including Arizona, are providing innovative, high-quality prekindergarten classrooms for 4-year-olds whose families' incomes fall below the poverty level, placing the children at high-educational risk. The classrooms for these children may be located in public schools or in childcare centers; however, the teachers typically are hired by state education departments and adhere to the teaching and early learning standards of those departments.

The National Institute for Early Education Research at Rutgers University (2006) examined 38 states with prekindergarten initiatives and documented the following information about prekindergarten programs in Arizona:²³

- Arizona began funding prekindergarten classes in 1991. In 1996, the funding for the program became the Arizona Early Childhood Block Grant (ECBG). The dollars in this program also are used to fund full-day kindergarten and kindergarten through third grade supplemental services.
- In 2005-06, the state invested \$12,258,488 in prekindergarten programs for 5,340 children. This equates to about \$133 per 4-year-old child enrolled in an ECBG program. School districts are responsible for allocating the funds, and money may go to a childcare center or to a Head Start center if parents choose one of those settings for ECEC services. Family incomes must be at or lower than 185 percent

of the federal poverty level in order for a child to be eligible. Arizona served 6 percent of its eligible 4-year-olds.

- In 2006-07, Arizona increased funding for full-day kindergarten in order to reach more children. This move may impact public school prekindergarten classroom space and availability since some schools will use the rooms for expanding kindergarten. Some school districts also use federal Title I funds to support public school prekindergarten classrooms.

Research studies on the impact of high-quality prekindergarten programs tend to indicate that the children, particularly poor children, who attend high-quality prekindergarten programs show gains when they enter kindergarten. However, Arizona does not have impact data that indicate if, over the past 16 years, the prekindergarten and ECBG programs have made a difference in young children's outcomes and education trajectories. Coupled with a lack of school-readiness indicators, it is difficult to know the effectiveness of most of Arizona's ECEC investments.

Oklahoma, New York, North Carolina, and Maryland are among states that have passed legislation and have made substantial investments in prekindergarten models for ECEC services. Oklahoma, for example, served 70 percent of its 4-year-olds in 2006 and committed more than \$112,000,000 to this initiative. North Carolina invested almost \$60,000,000 for prekindergarten services for slightly more than 15,000 4-year-old children. These states also have committed significant funds for improving professional development, including teachers' salaries.²³

Summary and Policy Implications

The most salient finding in early childhood education and care research is the fact that high-quality programs make a difference in young children's social-emotional and cognitive

development. This is especially true for poor children, yet poor children have the least access to high-quality programs.

Arizona has invested minimal resources in ECEC, but the public and policymakers are demanding more accountability from education programs in the state. In efforts to improve the quality of ECEC programs and accountability, standards are being raised for teachers and for the children they teach.

The goal of improving quality in ECEC programs in Arizona focuses on professional development, an area of great need. There are several policy issues that should be kept in mind as the state engages in earnest conversations about increasing the rigor of early childhood professional development programs. Some of these issues include:

- **Capacity** — In July 2009, programs receiving Early Childhood Block Grant funding will have to employ teachers who meet the new ADE requirements for early childhood education. ADE does not know how many qualified teachers there are right now and how many will be needed by the deadline. Both large and small districts are at high risk for shortages of qualified personnel. In addition, ECEC services must increase, given the growing numbers of children age 5 and under. The workforce is not large enough to handle the volume of children.
- **Quality** — Improving program quality and teacher education costs money. Raising quality probably will result in increased teacher salaries, increased tuition for children in nonpublic programs, and increased taxes to cover the rising costs in public programs. Policymakers and the public will have to balance the need for high-quality ECEC programs with finding ways to pay for the costs of high quality.
- **Accessibility** — Teachers who want to raise their education levels are faced with many hardships, including balancing work, family, and school. Frequently — especially in rural areas of the state — there is limited access to college courses, including online, high-quality coursework. In addition, many community-college courses are not rigorous and courses do not always transfer from one school to

another or from a community college to a university. Policymakers have to look at new technology investments and strategies for raising the quality of ECEC courses across the state.

Chapter 6

The Preparation and Support of Mathematics and Science Teachers for Arizona

James A. Middleton

The recruitment and retention of qualified mathematics and science specialists for middle and secondary schools is an acute problem nationwide (Guarino, Santabanez, & Daley, 2006), and the shortages are especially severe in rural and high-poverty urban districts. While the number of students enrolling in public education is increasing exponentially, the proportion of teachers in these high-needs areas is not keeping up. Science and mathematics teachers also tend to leave the profession at a higher rate than elementary teachers.¹

Conversely, in some areas like history, there is a glut of qualified teachers, making the marketing demands for their skills very different from a mathematics or science teacher who will most likely enjoy multiple offers from competing school districts. The different market demands for these subject-matter specializations require a strategy of targeted recruitment, support, and retention. In addition, it also might require redirection of potential teachers from subject areas of less need to areas of higher need. In either situation, however, increasing the quality of teachers' knowledge and skills is at least as critical for the economic and social well-being of Arizona as finding additional individuals to serve the profession in areas of high needs.

This chapter explores suggestions for mathematics and science teacher education with the view of improving the situation in Arizona and, through it, the intellectual capital of its workforce. The discussion is framed around the search for a comprehensive strategy for the

recruitment, training and retention of highly proficient teachers in these areas, increasing the pool of candidates to ensure the availability of excellent personnel to all communities in the state.

Recruitment, Support, and Retention

On the surface, the dual goals of increasing quality by increasing standards and rigor, while encouraging more potential teachers to enter the profession, may seem at odds. These goals, however, are not incompatible. Given the general negative public perception of teaching, and given a sizeable proportion of potential recruits who either do not enter or leave the profession because of this perception, increasing rigor and requirements may actually be a way to encourage people who want to work hard and make a difference to enter and persist in teaching. Darling-Hammond, for example, has shown that when states increase content and pedagogy requirements for teachers they increase the number of candidates for teaching and increase the quality of instruction, resulting in powerful achievement gains for pupils in both rich and poor areas.²

This may not be enough, however. For the most successful states in Darling-Hammond's analysis, boosting rigor was part of a multifaceted, statewide strategy for success. Successful states enacted extensive recruitment campaigns starting with promising high school students to widen the pipeline. They introduced increases in teacher salaries to both reward current teachers and to create incentives for prospective teachers to join. And, critically, they developed programs of support and mentorship following certification to help young teachers learn the ropes in a "residency" period. It must be noted, however, that the most highly-qualified teachers often have higher-mobility rates among districts due to their high market value.³ So, while state data for these teachers may show increases in pupil achievement,

district-level data for pupils may be mixed due to high-quality teachers leaving for greener pastures. For science and mathematics teachers, mobility due to market demand does seem to be a more significant factor than in other subject-matter specializations.

Extensive Statewide Recruitment

Arizona has the luxury of three excellent public universities strategically placed geographically to be able to serve nearly all of the potential teachers in the state. The universities are in a position to collaborate in areas of high needs, particularly in science and mathematics. Several cross-university collaborations to this effect are in process, and it seems opportune to engage the largest producers of teachers in the state in determining an effective solution to the problem of selective recruitment into secondary fields. Like the states in Darling-Hammond's analysis,⁴ working with high schools to identify promising students in high-needs fields, provide scholarship assistance, and to gain experiences with university faculty and practicing educators seems to be a promising recruitment practice to engage in. However, to increase the numbers of teachers to an even adequate level in mathematics or science, universities individually would have to hire many new faculty who are themselves in short supply nationally.

Hiring new faculty is only one potential (and expensive) solution to this problem. Another approach is to build collaborative programs that share the burden across faculties in each institution and even across institutions of higher education. Such programs would reap the rewards in terms of tuition and state appropriations collectively. High school districts would have the incentive of growing their own future teachers, taking advantage of the tendency of people to want to live and work close to their home. Community colleges and universities would have a ready pool of applicants.

However, the undergraduate population as projected will still not be enough to handle the need caused by population growth in the state. Other potential markets for certification are worth a try. From the perspective of a university administrator, the post-baccalaureate population appears to be a good bet to expand recruitment. This is partly just due to numbers: There are more individuals in Arizona between the ages of 22 and 65 than between 18 and 25. Encouraging individuals to leave their professions, take early retirement, or work as a teacher in addition to their current job can tap into this vast pool of professionals in the state, bringing in needed job skills with knowledge of how academic content translates from school to work. The teacher-education programs at the Regents' universities, private universities, and community colleges are actively trying to figure out the post-baccalaureate market. Still, in the areas of science and mathematics, we are woefully short of candidates. Like the high school recruitment strategy, a collaborative effort seems to be a necessary, if not sufficient, condition to develop strategies that also have sensitivity to local context.

Lastly, about half of the new teachers each year in Arizona come from out of state.⁵ They appear to be able to find jobs and integrate into the system without too much problem. Again, this appears to be true in more affluent urban and suburban communities. In-migration does not seem to be improving the teacher base significantly for rural and poorer urban communities.

If the state raises requirements for secondary certification, however, it is not clear what impact such a policy will have on the eligibility of in-migrating teachers to be certified and classified as "highly qualified." Will the state's requirements be too rigorous for such teachers to easily plug-in to the public school system? Will the benefits of employment as a secondary

teacher justify the costs of retraining? How we handle reciprocity with other states is at stake, as well as the cost of retraining and supporting in-migrating teachers.

Retention is Our Best Recruitment

Estimates are that by 2010 more than 2,000 teachers under age 45 will leave the profession each year.⁶ Stability of quality teachers in the life of a student is one of the primary indicators of student achievement.⁷ If students have effective teachers for three years in a row, their achievement greatly outstrips their counterparts who have one, two, or no years in class with an effective teacher. So it follows that retaining and supporting effective mathematics and science teachers in-district is a key strategy for successful teaching.⁸ This may require seriously tackling the use of incentives for teachers in subject-matter specializations where there is chronic need, the provision of professional development support, and the redesign of school climate to foster a positive workplace for secondary teachers so that they do not become frustrated and leave the profession.

One method that has shown some results in Arizona and other states is to permit retirees to return to teaching 49 percent. This enables the retiree to make additional money, continuing to be productive in schools, but allows the district to forego paying additional benefits. Job-sharing, recruiting part-time professionals from business and industry, in-school retraining and other options are viable, used across the globe successfully, and may enable more parents, candidates from business and industry, and continuing graduate students to earn money, help others, and make a difference. We have not yet explored these solutions extensively in Arizona.

Induction, Support and Mentoring

Akin to the medical profession, schools of education and school districts around the nation are developing support systems, similar to residencies, intended to assist young teachers in the most vulnerable first two years in the field. While there is a lot of support for such induction programs, evidence of their effectiveness is mixed.⁹ What seems to be effective for secondary mathematics and science teachers is to design induction programs to be content-specific, deepening young teachers' content knowledge and their knowledge of teaching methods, assessment, classroom management, and other critical skills in their chosen content area. Research shows that such programs are more effective in retaining teachers, and in resulting pupil achievement, than generic professional development, even if the generic programs include mentoring.¹⁰

Differential Pay and Pay for Performance

In both national and Arizona analyses it appears that there are several critical issues preservice teachers must face as they make the decision to enter the profession. The first concerns the economic rewards they will receive from their chosen profession. Teachers, for most of their careers, do not make a salary comparable to even entry-level business and industry positions. In science and mathematics, this disparity is even more dramatic. The average engineer will make 2 to 3 times the salary entering the profession than a first-year teacher. Often an engineer will enter their chosen field at a salary greater than the maximum salary a teacher could receive with 30 years experience (see "Educating Arizona," a report of the Arizona Community Foundation).¹¹ Because of these economic considerations, some other incentive or personal motivation must make up for the lack of material reward the profession affords.

The second issue concerns social pressure. Universities, government agencies, businesses, and industries are legitimately encouraging students to enter science, technology, engineering, and mathematical fields to bolster Arizona's economic footprint in biodesign, technology design and deployment, and environmental sustainability. The pressure to recruit students to these exciting new fields is intense. There is substantially less pressure to increase teacher candidates in these areas. Moreover, public perception of teaching compared to other viable professions does impact teachers' decisions to remain in the profession, and it is likely to impact students' decisions whether or not to become a teacher in the first place.

To counter these fiscal and attitudinal disparities, it makes sense to consider a system of differential pay. That is, to pay effective teachers more, to develop differential salaries for teachers in academic areas of critical economic need in the state, and to induce more teachers who hold these academic specializations to seek employment in rural and impoverished communities. Higher salaries are a major inducement for teachers to leave their school or seek employment outside the profession. But, when applied in schools, higher salaries keep teachers in a district.¹² It makes sense for Arizona to consider a plan that compensates teachers fairly and places them where they are most needed, but that is able to react to market pressure for high-needs subject-matter specializations.

Changing Teacher Preparation Programs

As students begin to face the adolescent years, they will matriculate into middle and high schools, staffed by teachers who may or may not be prepared to teach the concepts and skills students need to engage productively in the changing Arizona economy. In mathematics (and by extension, science) it has been shown that teachers who have a deep grounding in the foundational concepts of their subject matter are able

to think more creatively about the content they are teaching and are more able to capitalize on student reasoning to design instruction.¹³

However, only about half of the practicing secondary teachers in Arizona have an academic major in the subject area they are teaching (National Center for Education Statistics). This is partly because the requirements to teach in grades 7 and 8 overlap certification areas. Students in the middle grades may be taught by teachers who have generalist elementary K-8 certification, or by teachers with single-subject secondary (7-12) certification. But it also is due to the issues of supply and demand in high-needs subject matter, coupled with the difficulty of recruiting and retaining teachers in rural and inner-city communities.

Yet it is these teacher quality characteristics such as certification status and degree in the field to be taught which are most highly correlated with student outcomes.¹⁴ Other variables, such as pupil-teacher ratios, class sizes, and the proportion of school staff who are teachers, show relationships to student achievement which are weak at best. Given that half of all teachers in Arizona do not have an academic major for the subject matter they are teaching, one in 20 mathematics or science teachers in the state are teaching out-of-subject entirely, and that in the middle grades it still is common practice for science and mathematics teachers to have elementary certification with no upper-division coursework in science or mathematics fields at all,¹⁵ some way of increasing the skills of these teachers is in order. It is a matter of quality assurance.

Redesign Content and Education Coursework

For their part, secondary certified teachers also take many generic courses in education that are not tailored specifically to the teaching of their subject matter, or for

their particular age range. Moreover, nationwide, many able candidates leave mathematics and science-related majors not because of poor grades or inability to perform, but because courses often are taught poorly, assessed poorly, and because the environment in the academic department is one of weeding out as opposed to nurturing excellence.

To this end, it might make sense to rethink what courses are offered and how they are organized to emphasize both the highest-quality content and the highest-quality pedagogy. (The word “pedagogy” comes from Greek, meaning “to lead or teach a child.” It is used in education to mean teaching methods and skills applied to instruction.) One case that appears to have promise is geosciences education at Arizona State University. In that model, all students take the core subject matter which has been restructured to include:

- 1) The science of geology.
- 2) Geosciences engineering and technology.
- 3) Geosciences education.

For their first two years, all undergraduates receive solid grounding in these areas in an interwoven curriculum. For their last two years students may focus on one of the three areas for their major. However, all students continue to take seminars together that engage them in understanding the pedagogical implications of the advanced science, the ways in which technology is changing the face of both science and everyday living, and how education can help the science and technology fields by promoting best practices.

What this particular example emphasizes is that the academic content and education methods need not be exclusive. Rather, coursework can be designed to teach the best things in the best ways throughout the four years an undergraduate student engages in their teacher-preparation program. This is a key recruiting and retention strategy because it has the potential

to decrease the attrition rate of students from science and mathematics majors (and possibly other majors with high attrition like engineering), creating a larger pool of potential educators at the front end.

Middle School Certification

This approach still does not increase the knowledge in an academic specialization for middle school teachers. Given the large numbers of elementary-certified teachers who will be assigned single-subject classrooms in middle schools, some other way of developing quality content understanding seems to be required. There are two potential strategies that might be considered to make the middle years productive both academically and socially as pupils make the transition from childhood to adolescence. The first would be to work with the Arizona Department of Education to develop middle school certification in key content areas, among which are mathematics and science. Such a program would focus teachers on the critical years between the ages of 11 and 15, where tremendous cognitive gains take place, but where students typically tend to disengage from science and mathematics.¹⁶

Such certification would focus on the development of pre- and early adolescents and the critical content they need to engage in (e.g., proportional reasoning in mathematics, matter and energy in science). Acceleration options for more able students as well as enrichment for the general population would be emphasized, but not in a model that merely applies a high school curriculum to younger students. Teachers would be engaged in the design of classroom environments that take advantage of middle schoolers' increasing cognitive capacity, and that manage their often erratic behaviors (oscillating between child and young adult) as they struggle with growing up. Academically, it would require either a minor or preferably a major in an academic specialization.

An Academic Minor for all Elementary Teachers

It could be said that elementary-certified teachers learn a little about a lot of things. When asked to focus and teach a single subject at a high level, they do not have the knowledge of the content to know what to emphasize at what times, nor how the content fits together as a coherent system of thought. There is no complete solution to this problem, but a partial solution might be to require all elementary-certified teachers to take at least an academic minor. Minors generally average about 24 to 27 units (eight or nine classes), including several upper-division (junior and senior year) courses. In requiring this, a certified teacher would automatically be considered “highly qualified” under the No Child Left Behind Act as interpreted by the State of Arizona for middle-school instruction. Moreover, should such teachers wish to obtain a major and become secondary certified, they would only have to take an additional 9 to 12 units — less than one semester of coursework. Combined with incentives, this could provide an additional set of secondary mathematics and science teachers to fill needed gaps in the state flexibly and in a manner that rewards initiative. But most importantly, it would aid in the development of teachers’ understanding of mathematics and science content, so that every teacher would be able to have some special niche that marks them as an expert among their peers.

What Mathematics and Science Teachers Need to Know

A comprehensive listing of content across mathematics and all science fields and across types of certification is beyond the scope of this chapter. But there are four categories of knowledge and skills in which all teachers should demonstrate proficiency, and apply regularly in their practice. State regulations require certification programs to engage prospective teachers in these fundamental bodies of knowledge with the expectation that they will be able

to interweave them to design classrooms that maximize student potential. Each of these areas are discussed briefly with an eye toward making them more rigorous and applicable to individual students' needs and predilections.

Learning and Development

Secondary teachers need a useful understanding of human learning, adolescent development, and social psychology. This would include both general principles that apply to all humans, but also specialized knowledge pertinent to the grade-band and content they will be teaching. Teaching biology has different learning, development, and social implications than teaching mathematics. The research bases for these areas are different, and the applications of that knowledge to pedagogy is content-specific. But to complicate matters, the sciences make heavy use of mathematics to model the phenomena they study. Some work on integrating subject-matter learning in context and in teaming across subject-matter specializations also is in order.

Special Needs

All teachers must be able to include children with cognitive and physical needs in the regular classroom. This is not easy, and the burden on the regular classroom teacher to ensure that all children receive appropriate instruction is becoming progressively more challenging. Tools and techniques, adaptive technologies (such as physical models of atoms for the blind, visual tools for the deaf, or audio recorded texts for the dyslexic), inclusion practices, and cultural implications of special needs are all an important part of a teacher's repertoire. Again, while there are some generic models that work, actual application of these skills is content-specific, so appropriate experiences in content and methods courses is critical as opposed to having stand-alone special education coursework exclusively.

Gifted Education

The education of mathematically and scientifically gifted students deserves mention in its own right. Evidence suggests that:

- 1) Even if one takes a rather conservative definition of giftedness, the top 5 percent in achievement on any given measure is considered “gifted.”
- 2) Not all students are gifted in the same things.
- 3) By using multiple measures across multiple academic subjects, the majority of students appear to be gifted in at least one aspect of the curriculum.¹⁷

The implications for this can be profound for teacher preparation. How does one recognize latent ability in a student? What are the markers of students whose motivation and drive enable them to excel beyond predictions? Particularly as science and engineering become more inter- and multidisciplinary, the ability to identify individuals' gifts and to place them in productive workgroups so that their gifts complement and amplify each other is a skill that may deserve extra attention.

In addition to identification, teachers must understand and be able to apply techniques for acceleration, enrichment, and adaptation for more able students in their field of study. It might be possible, if districts worked together with universities, business and industry, and government agencies, to provide a broader array of opportunities for able and motivated science and mathematics students.

Content of Academic Specialization

As alluded to earlier, there are different ways of conceptualizing and packaging academic content. Academic societies for all major content specializations have developed standards that define what this central content is and how it should be delivered to students (for example, the National Council of Teachers of Mathematics and the National Academy of

Sciences).¹⁸ But these standards are typically very general, intended as the skeleton, so to speak, upon which would hang the actual content needed for different walks of life. It is up to the states to develop standards of proficiency that contribute strategically to their business and economic interests and to fit local social constraints. Arizona is moving from an economy of in-migration, dependent on the construction and tourism industries to an economy based on information, science, and technology, supplemented by agriculture and agribusiness, natural resource utilization, and tourism. These new primary drivers will predicate that a new set of 21st century skills be conceived that make heavy use of scientific inquiry and on informatics, the ability to make sense of, and decisions about, data.

These 21st century skills will require different emphasis on content for preservice teacher preparation. In particular, the ability to reason with complex data is central to the modern scientific enterprise, yet it is not always a major emphasis in the Arizona mathematics or science standards. Moreover, technology is becoming basic to all applications of science, meaning that it has recently become almost impossible to do science at all without heavy use of computational technology. How and when technology should be incorporated as required-learning tools and what specific technology skills mathematics and science teachers must learn is a critical question.

A first stab at listing some of these 21st century skills for science and mathematics content would include, but not be limited to, the following:

- Logic and experimentation. Teachers should be able to construct and evaluate scientific arguments in their field based on theoretical coherence, logical reasoning, and empirical evidence.

- Inductive reasoning. Teachers should be able to mine patterns in data in their field, model those patterns mathematically, and project behavior beyond the existing data.
- Modeling and simulation. Teachers should be able to apply and develop models of complex scientific phenomena, and be able to understand the importance of simulation in model formulation and testing.
- Role of science and mathematics. Teachers should understand the historical roots of their field and how it contributes to a better, more productive society. They should also understand the ethical dilemmas of their field and how knowledge can be misused.

Because these skills for the new Arizona economy are so foundational, some serious thought regarding teacher certification requirements, course structure and content, and laboratory experiences is needed so prospective teachers understand how the content they are experiencing shapes what they will be able to teach in the future.

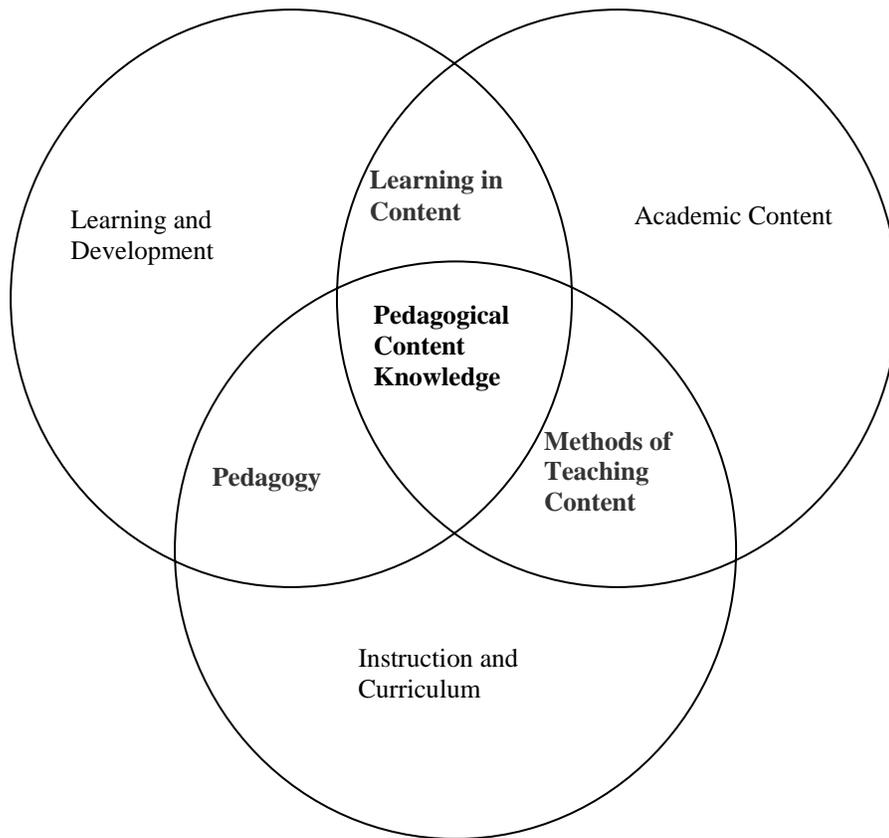
Pedagogical Content Knowledge

It is not enough to know just the content. It is clear from 30 years of research that teachers must integrate their knowledge of content with their knowledge of the student and knowledge of pedagogy to construct what is known as pedagogical content knowledge — what to teach and how to teach it so that students learn. This kind of knowledge tells the teacher that a particular student is struggling with, say, proportional reasoning, and it gives her or him the ability to question the student deeply, develop a strategy to help the student learn, and to assess whether or not she or he has been successful. It requires knowledge of the content, learning and development, and knowledge of teaching methods and curriculum. To build this kind of knowledge, we must merge what has heretofore been separate coursework into a coherent framework of useful knowledge, strategies, and skills.¹⁹

The reason this is so critical for science and mathematics teachers is that they have to be able to bring all of this knowledge to bear to engineer productive learning environments through lesson design, curriculum development, and choice and deployment of technologies. All aspects of text, technology, grouping strategies, questioning, and assessment must be integrated into a system of instruction that works for all.

Figure 6.1

Pedagogical content knowledge as the merger of three critical domains teachers must know and be able to apply.



Use of Technology

For the Arizona economy, which has staked its future on the expansion of technology design and technology-related enterprises, preparation to use technology is critical. Teachers are expected to enter the classrooms with the ability to apply not only productivity software, but software for data analysis and interpretation, knowledge integration and organization, and communication. The Governor's task force recommended in 2006 that the state heavily invest in the technological education of science and mathematics teachers, upon whose shoulders the burden of preparing students falls.²⁰

There are five general types of software utilized in education.²¹

1. **Review and Practice.** This kind of software gives students practice on skills they have already learned in class. Examples are Algebra Blaster and other drill applications.
2. **General Tools.** This kind of tool can be used across a wide variety of applications. Examples are spreadsheets, word processing software, mind-mapping tools, computer assisted design programs, statistics applications, graphing calculators, and the like.
3. **Specific Tools.** Specific tools are designed to do one job and one job only. Examples are media players, file extractors, and many business and accounting applications.
4. **Environments.** A relatively new form of technological tool, environments like virtual reality and first-person role-playing games are beginning to hit the education landscape and the business and decision-making landscape by storm. Teachers must become familiar with their applications to be able to use, apply, and teach the costs and benefits of such immersive systems.
5. **Communication Tools.** Communication tools include e-mail, video-conferencing, collaborative whiteboards, blogs, and other ways to share and structure information.

Teachers are expected to be familiar with each type of software, understand their authentic use in engineering, business, and other applicable fields, and be able to integrate software effectively in grade-level appropriate tasks. Also important is the understanding of when not to use computational tools, and the costs, benefits, and dangers inherent in a connected technological world. Content matters. The sciences and mathematics each use different software and different tools for data collection and analysis. It follows that each academic specialization will emphasize these kinds of software differently and different content-specific applications will be used as tools for instruction. How to choose appropriate software and how to integrate content in a technological environment is still an open question, but one that teachers will confront very soon as technology continues to advance.

Quality School Sites for Supervised Teaching

Like all teacher candidates, mathematics and science teachers need good role models to follow, to learn the ropes from. The Carnegie initiative, Teachers for a New Era, defines teacher preparation as an “academically taught clinical practice profession, requiring close cooperation between colleges of education and actual practicing schools, master teachers as clinical faculty in the college of education, and residencies for beginning teachers during a two-year period of induction.”²² This model of teacher preparation requires the identification of, and partnership with, models of excellent practice. By and large, however, there are few schools and fewer districts that exemplify the kind of teacher practices outlined in this chapter with a sizeable proportion of their employees. Rather, many teachers are relatively isolated and often work against the system to beat the odds. There are pockets of excellence in the state (see the Morrison Institute Report, “Beating the Odds,” 2006),²³ but these are so few and far between that to place only 200 or so prospective science and mathematics teachers each year

in the highest-quality classrooms has proven difficult at best. How then is it possible to maximize the quality of our school placements while at the same time trying to improve the conditions of education more broadly?

There are no easy answers to this question. Teachers tend to teach as they have been taught, and they tend to conform to the norms and unwritten rules of the schools in which they are placed. Some effort to identify the best and most effective science and mathematics teachers in the state and some way to include these teachers in professional preparation programs is vital.

Create Virtual Professional Development Schools?

With the current capabilities of video streaming and communication software, an idea has been brewing around the country, but few have given it much attention until now. Given that the best teachers are so scattered across the state, it behooves us to think of organizing identified highly-proficient teachers into a virtual “school” that could be used for observation, “virtual visitation,” and video conferencing with teachers, students, and administrators. Streaming video is used effectively in counseling psychology and in teacher education to help neophytes study what goes on in real classrooms, with the ability to replay events, annotate questions or hypotheses regarding why particular behaviors worked (or didn’t), and then question the teacher regarding why she or he made the decisions she or he did at the time.²⁴ By organizing the best examples into a few virtual schools, all prospective teachers in the state would be able to see the best practices in action.

Summary

Many of the most important and most neglected of 21st century skills students need today are taught in science and mathematics classrooms. Given the shortage of highly-

proficient mathematics and science teachers, it is important to consider ways to fundamentally redesign mathematics and science teacher preparation, certification, professional development, and compensation strategies to capitalize on the talent we have in the state, and to increase the rigor and applicability of their training.

Chapter 7

Leadership for Teaching

John Pedicone

Schools face enormous challenges as the features of a global marketplace collide with established cultural norms and conventions. Leaders, in all sectors, need to address the reality that organizations simply cannot continue to do business as usual if they expect to maintain a competitive edge among industrialized nations.

This chapter explores the following areas:

- Conditions that exist for school leaders as teachers and administrators.
- The nature of leadership in support of quality classroom teaching.
- Implications of funding and their impact on teacher and leader development.
- Whether school administrators should be certified to support quality instruction and effective school management.
- The “pipeline” and the issue of supply to meet current and future leadership demands.
- The importance of relationships between leaders and stakeholders.
- The use of data to inform decisions and school-reform efforts.

This chapter will attempt to frame the picture of how leadership can support quality teachers in Arizona schools.

The Context

A quick peek at the Web provides some sobering insights into the way change has become the status quo for a significant portion of the population who serve as the foundation for modern society. YouTube, a virtual residence for information and human interaction, is a

striking example of the backdrop for any discussion of 21st century issues. This environment, which was not even in existence three years ago, receives an estimated half billion hits per week. Logging on to the site provides a stunning look at how we have changed in terms of communication and information management and how we will continue to escalate at warp speed.

A popular video clip, *Shift Happens*, describes some startling statistics.

1. The top 10 jobs that will be in demand in 2010 didn't exist in 2004.
2. Today's learners will hold 10 to 14 jobs by age 38.
3. We are preparing students for jobs that don't yet exist, using technologies that haven't yet been invented to solve problems that we don't even know are problems yet.
4. The amount of new technical information is doubling every two years.
5. Students who start college today will find that half of what they learn in their first year of study will be outdated in their third year of study and in 2010 technical information will double every 72 hours.

The challenges are amplified when we couple these facts with the reality that developing nations such as China and India are confronting the same issues with populations that exceed ours in escalating proportions. The law of large numbers magnifies the concerns with facts such as:

1. Twenty-five percent of the people with the highest I.Q.s in China constitute a population greater than the total population of North America.
2. There are more honors students in China than kids in the U.S.
3. In the same amount of time that 60 babies are born in the United States, 244 are born in China and 351 are born in India.

In the end, we must accept the fact that we are bound together with all people across the globe in a manner very different from the way it has been in the past. Technology and innovation have changed the world into a symphony composed of the ideas of every person on the planet. American public and private schools must adapt to the demands of modern society if they are to prepare students to meet the challenges of an increasingly complex environment. Teachers are the key to the transfer of knowledge and skills that will support change. Accordingly, we need to ask what must be done to ensure that they, themselves, are prepared and supported in order to meet those challenges.

Leadership for Teacher Quality

School leadership has a direct influence on teaching and learning. If teachers are to convey 21st century knowledge and skills to students in an increasingly complex environment, effective school leadership is critical. The Industrial Age officially ended in 1983 when Tom Peters' and Bob Waterman's runaway bestseller, *In Search of Excellence*, was touted as the new paradigm of organizational leadership throughout the Western world.¹ At the same time, American public education was confronted with a flood of reports, including "A Nation at Risk," which focuses on the failure of schools to address the growing demands of the 20th century and the complexity of the 21st century which loomed on the horizon as a daunting and troublesome reality that threatened to undermine the system unless significant change occurred. In the early sixties, equal access to a free and appropriate education was required by law and replaced in the seventies and eighties by the legal mandate that schools provide equitable educational opportunities for all students. This mandate was notched up by the present political agenda that holds schools and teachers accountable for all students being proficient in state standards of academic progress.

With these challenges, came increased demands. Camborn, Rowan, and Taylor studied a large sample of elementary schools. Their conclusions supported earlier study results indicating that elementary school leadership is most effectively provided by teams rather than by a single person.² Instructional capacity, a key to comprehensive school reform, is increased when members of the school community are involved in meaningful and authentic ways as members of leadership teams. According to their report, it is essential that leadership be distributed across districts, schools, and classrooms in order to meet the demands of an increasingly complex environment. Teaching increasingly diverse student populations would seem to require higher levels of collaboration by all members of the school institution. Add to this profile those students whose primary language is not English and those who are identified as requiring exceptional education services, and the demand for extensive and collaborative leadership has never been greater.

There exists a justifiable reluctance to release the control of activities that could get schools and districts into trouble and the result is a tendency to treat professional staff with a more directive style. This is in contrast to the need to collaborate and distribute leadership in order to develop ownership, solve complex problems, and enhance the development of innovative school models necessary to address the demands of 21st century schools. Clearly, this applies to school decision-making in general and in the current compliance-driven atmosphere surrounding state and national political agendas, distributive leadership tends to be replaced by more centralized decision-making. This tension has far-reaching implications for leadership.

Identifying individuals who possess the skills necessary to meet the challenges has become a major concern. A report from the Stanford Education Leadership Institute reported:

“The role of principal has swelled to include a staggering array of professional tasks and competencies. Principals are expected to be educational visionaries, instructional curriculum leaders, assessment experts, disciplinarians, community builders, public-relations and communication experts, budget analysts, facility managers, and special-program administrators as well as guardians of various legal, contractual, and policy mandates and initiatives. In addition, principals are expected to serve the often conflicting needs and interests of many stakeholders, including students, parents, teachers, district office officials, unions, and state and federal agencies.”³

Funding and Its Implications for Leadership Development

The recruitment and retention of skilled leaders depends upon adequate resources. School funding, however, is a major issue in Arizona. The Heartland Institute, a Chicago-based, free-market oriented research organization, ranked Arizona 48th in the nation in 2002 in the amount of money spent per pupil. The National Education Association listed Arizona as 15th in number of students but 50th in current expenditures per pupil. A recent “Quality Counts” survey, developed by *Education Week*, places Arizona 49th out of 50 states in school spending for education. It appears, then, that Arizona is ranked near the bottom in education spending per pupil when compared with other states across the nation.

Certification — Is It Necessary or Not?

One of the frequently debated topics that is receiving greater attention is the question of whether school leaders need to be certified. This question has been most often asked in relation to the superintendent-level positions but is being asked about school-building leadership as well. Some of the impetus for its redirection to the building level stems from the perception that there is a shortage of school leaders across the nation and, more specifically, in Arizona.

There also is a concern about whether principals are capable of meeting the demands of accountability and increased student achievement.

Arguments in favor of school leader certification are that:

- Superintendents' and principals' effectiveness greatly impacts student achievement most by the understanding of teaching and instruction.
- The main workforce of schools is comprised of teachers. Accordingly, school leaders should have workforce experience within schools relevant to the individuals who they are leading.
- Teaching experience is the vital practical-world experience from which to develop school leaders who can sustain reform efforts in schools.
- There is a growing body of research focusing on the importance of professional standards. The kinds of preparation experiences that are most effective in the development of effective school leaders can be instructive.
- The internship and authentic field experiences are emerging as critical attributes of quality preparation programs that should be expected of any school leader in the same way that practicums are required for most other professions.
- In view of the landscape of expectations that are the result of policy mandates and decisions about what the most effective skills and qualities are for successful 21st century school leaders, certification should be expected.

Arguments in favor of nontraditional school-leader licensure that does not require certification are that:

- The system is the problem and traditional certification programs are not producing effective leaders, especially in terms of fiscal responsibility and organizational management.

- It is one thing to understand teaching and learning, but that does not guarantee that schools will be organized to utilize that knowledge in favor of effective change.
- School leaders often lack the business acumen that is necessary to drive complex organizations and are paralyzed by their mental models of what schools are instead of what they should be.
- There are environments where traditional school leadership simply does not result in school improvement and it is more about raising expectations and implementing management principles that are more evident in business, the military or other industries.
- The shortage of school leaders at both the building and district levels calls for recruitment outside of the field just to meet the demands of student population growth.

The Pipeline

There is an acute shortage of qualified applicants for principal and superintendent positions in the state. For example, one rural district filled their superintendent vacancy with an administrator who the previous year had been an assistant principal. This shortage is anticipated to grow as the population of principals and superintendents ages and retires. One estimate is that 40 percent of the current principals and superintendents will either quit or retire in the next decade. Additionally, Arizona is a growth state. There is an anticipated 10 to 20 percent increase in the number of administrators needed to serve Arizona's children. Many districts, especially those in low-income and rural areas are dealing with high turnover and a dearth of qualified candidates to fill vacancies. Districts are meeting the need by having teachers serve as acting administrators while obtaining emergency certification. The Arizona Department of Education estimates there will be 170 principal vacancies in the coming year and the educational system in the state will only be able to produce 80 new educational leaders

to fill those vacancies. The situation is more acute in rural areas where travel to universities and other institutions that offer certification classes is a major barrier.

According to data gathered in Arizona, it is not only a matter of the number of available certificated administrators, but also an issue of whether qualified candidates are either willing or available to serve in schools and districts based on factors such as location, condition, and reputation. In the past two years 68 superintendents from 227 Arizona school districts, have left and been replaced resulting in a turnover rate of 30 percent. There is no indication that this trend will change. This suggests that district-level leadership should be a focus for concern. According to Panfilo Contreras, executive director of the Arizona School Boards Association (ASBA), while in general, candidate pools for administrative positions have been severely reduced, it is more an issue of conditions and community factors that seem to make the difference. He indicated that some districts have no problem recruiting applicants for any position that opens while others find it difficult, if not impossible. With the demand for greater accountability and the pressures placed on school leaders to meet policy directives, factors such as the number of nonperforming schools, social demographics including socioeconomic levels of students, and other community conditions play an important role in the ability of a district to identify the right leader for the job.

In addition to general environmental considerations, a powerful factor that impacts whether effective district-level school leaders choose to apply for positions in districts is the reputation of the governing board and whether the relationship between the district leader and the board is positive.

Salary also can represent a barrier to recruitment of school leaders. In general, when a teacher who has been in the classroom for eight years or more applies for an administrative

position, most districts will offer starting salaries that are less than the salary the teacher is currently earning. This is the result of the additional number of days an administrator works during the school year (from 185 to 200 contract days as a teacher to 261 as an administrator) and the number of compensation strategies put in place in recent years that have resulted in significant increases in teacher salaries. (Career Ladder, Proposition 301 classroom fund, governor's additional teacher compensation fund, casino revenue, trust land dollars, etc.) While this is not to say that teacher compensation is adequate, it suggests that the administrative salary compensation systems have been impacted.

Home, Community, Business, and School Partnerships

What happens in the classroom is directly impacted by the extent to which teachers feel supported by the community in which they work. School leadership assumes responsibility for the engagement of key constituents and shares with teachers the responsibility for cultivating positive parent relationships. The importance of partnerships between schools and constituents cannot be over-emphasized. Schools assume responsibility for the educational programs in which students engage but they also accept responsibility for the general welfare of students while in their care. This *in loco parentis* mandate requires that when a student enters the schoolhouse door, parents can expect that the students are safe, well-cared for, and not exposed to influences, within the control of the institution, that could cause harm to students. The critical nature of the relationship between parents and teachers has always been one of the keys to successful schooling. Most people over age 40 will relate multiple examples of the support their parents gave to teachers and that "if they got in trouble at school they knew they would be in trouble at home." While this is still the case in some environments, many

educators would argue that in today's educational enterprise that attitude is the exception rather than the norm.

In addition to the importance of partnerships with parents, public schools have direct interaction with the communities in which they reside. School districts have interdependent relationships with the citizens who reside within their boundaries. The quality of the schools and the relationships that exist between them and organizations that provide essential services are critical factors in promoting the overall effectiveness of all concerned. Social agencies, which provide support for youth, families, and the elderly, do not operate in a vacuum. Competition for limited resources can divide agencies or, if handled productively, bring them together in a collaborative synergy that maximizes those same resources. School systems play a real role in helping to make that happen. Schools serve those same individuals who live in their district boundaries. Whether they are school-age, have school-age children or live with or around families, the impact of school programs resonates throughout every neighborhood. Homeowners associations, Neighborhood Watch groups, community action committees, and others all interface with the schools that operate in their areas. In addition, school systems have an effect — directly and indirectly — on the nature of economic development in local communities. In many cases, school districts are some of the largest employers in communities. Not only do they serve the community by providing educational services, but they also support the local businesses and agencies by employing citizens who contribute to the overall economy. Schools also have a direct impact on commercial activity as a result of their need to purchase goods that are required in order to sustain their organizations. Further, and some would argue most critically, the perception of the health of the local school district has a direct impact on the ability of local businesses to recruit employees from out of state into

key positions in their organizations. As one Tucson corporate executive stated, “If people’s perceptions of our local schools are positive, they will come and bring their children into the community. If those perceptions are negative, it is almost impossible to get them here.”

In Arizona, efforts have been made to develop business and education partnerships at the county and state levels. An example at the county level is the Pima County Business and Education Roundtable (BER), comprised of more than 100 business leaders and educators who have an interest in advancing excellence in preK-12 education in Pima County. The group meets quarterly to focus on improving opportunities for students, workforce readiness, and public education policy. At the state level, the Arizona Business Education Coalition (ABEC) is an organization of business and education leaders from across the state who joined together to focus energy and resources on the success of the preK-12 education system in Arizona. ABEC encourages a comprehensive and long-term effort to bring about quantifiable change in the system. Their principles of operation indicate a strong commitment to creating a well-educated workforce and a vital society. As Craig Barrett, former CEO of the Intel Corporation, stated at the launch of the organization in Phoenix, “As business and education leaders, we have opened this dialogue because we believe that the quality of our future civic, social, and economic life depends on the quality of education available to all students at all levels of our educational system, now and in the future.” This statement exemplifies the nature of the belief system that serves as the foundation for the view that public education must work with the business community if schools are to succeed and move forward into the 21st century. Leadership is a critical key to that happening.

Data, Data, and More Data

In order for teachers to make quality instructional decisions, the use of data to inform action seems obvious. Decisions about any aspect of school operations require information that is adequate, understandable, and accurate. One would expect that in educational institutions, data is abundant, accessible, and easy to collect and understand. To some extent, that statement is true. With the introduction of technology, the speed and volume of data has increased exponentially. However, what should be an asset can quickly become a liability based on the sheer magnitude of the information available to school leaders who, in some cases, are unprepared to manage the information and are incapable of handling the volume of data being asked for by outside agencies. It also is a challenge when information is not consistent within and from outside of the organization. Whether the issue is a comparison of dropout statistics, school funding, academic performance, or the myriad of concerns that confront educators, being able to use reliable and valid data upon which to base critical decisions is essential. This concern has increased as the stakes have risen in terms of the consequences that exist for schools if they are judged as not making adequate progress toward established goals. School leaders spend a great deal of their time understanding the rules, compliance requirements, and technical aspects of the mandates. Data has become the foundation for decision-making of all kinds and at all levels.

Districts are increasing their staff development for professionals in order to better prepare them to operate in an environment where information and skills transfer becomes increasingly complex. Most administrators will attest to the fact that teachers are working about as hard as they can. Leadership's job must be to provide support and resources that will make the classroom teacher's job more efficient and therefore more effective.

Summary

Research supports what all of us have known since we were in school ourselves: an effective teacher is the single-most powerful influence in the success of students. It also is true that a weak teacher has a significant negative impact on student achievement and each time an individual student has an ineffective teacher, it amplifies the damage and the likelihood that she or he will fall behind. Today's teachers are faced with enormous challenges that will surely continue as the demands of the 21st century are clarified and better understood. If we expect teachers to meet those challenges, we must work together to help make that happen. Our resolve can make the difference in inspiring educators to embrace opportunities with a sense of passion and hopefulness.

Endnotes

Introduction

1. D. L. Ball, *The Work of Teaching and the Challenge for Teacher Education*. Charles W. Hunt lecture presented at the annual meeting of the American Association of Colleges for Teacher Education, New Orleans, 2008.
2. K. A. Ericsson and J Smith (Eds.), *Toward a General Theory of Expertise: Prospects and Limits*. New York: Cambridge University Press, 1991.
3. L. Darling-Hammond, *The Right to Learn: A Blueprint for Creating Schools That Work*. San Francisco: Jossey-Bass, 1997, p. 69.

Chapter 1. The Teaching Force in Arizona

1. Most figures for this chapter are taken from data provided by the National Center for Education Statistics (www.nces.ed.gov) or the Arizona Department of Education (www.ade.state.az.us).
2. Arizona Community Foundation, *Educating Arizona: Assessing Our Education System* (Birth-Grade 12), January, 2008, p. 44.
3. p. 43.
4. R. Gau, L. B. Palmer, R. Melnick, and R. Heffernon, R. *Is There a Teacher Shortage? Demand and Supply in Arizona*. Tempe, AZ: Morrison Institute for Public Policy, Arizona State University, 2003.
5. Job Openings and Labor Turnover Survey, January 2008. News. Bureau of Labor Statistics, United States Department of Labor. <http://www.bls.gov/news.release/pdf/jolts.pdf>
6. National Commission on Teaching and America's Future, *What Matters Most: Teaching for America's Future*. Kutztown, PA: Kutztown Publishing, 1996.
7. E. F. Fideler and D. Haselkorn, *Learning the Ropes: Urban Teacher Induction Programs and Practices in the United States*. Belmont, MA: Recruiting New Teachers, Inc, 1999.
8. S. A. Bobbitt, M. C. Leich, S. D. Whitener, and H. F. Lynch, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Follow-up Survey:1991-1992*. Washington, DC: NCES, U.S. Department of Education, 1994; R. M. Ingersoll, The teacher shortage: Myth or reality? *Educational Horizons*, 2003, 81(3), 146-152; and J. Marvel, D. M. Lyter, P. Peltola, G. A. Strizek, and B. A. Morton, Teacher attrition and mobility: Results from the 2004-05 teacher follow-up survey. U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 2007.
9. B. Berry, E. Fuller, with A. Williams, A. *Stemming the Tide of Teacher Attrition: How Working Conditions Influence Teacher Career Intentions and Other Key Outcomes in Arizona*, 2007. Retrieved January 18, 2007 from <http://www.teachingquality.org/twc/whatweknow.htm>
10. Arizona Community Foundation, *Educating Arizona: Assessing Our Education System* (Birth-Grade 12), January, 2008, p. 44.

11. J. Marvel, D. M. Lyter, P. Peltola, G. A. Strizek, and B. A. Morton, *Teacher Attrition and Mobility: Results from the 2004-05 Teacher Follow-up Survey*. U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 2007.
12. L. Darling-Hammond and G. Sykes, Wanted: A national teacher supply policy for education: The right way to meet the “Highly Qualified Teacher” challenge. *Education Policy Analysis Archives*, 11(33), 2003. Retrieved January 18, 2008, from <http://epaa.asu.edu/epaa/v11n33/>.
13. S. Markel, *The Condition of Teacher Quality in Arizona: 2004*. Retrieved January 18, 2008 from http://eps1.asu.edu/aepi/AEPI_2005_annual_report.htm
14. R. Gau, L. B. Palmer, R. Melnick, and R. Heffernon, R. *Is There a Teacher Shortage? Demand and Supply in Arizona*. Tempe, AZ: Morrison Institute for Public Policy, Arizona State University, 2003.
15. S. Markel, *The Condition of Teacher Quality in Arizona: 2004*. Retrieved January 18, 2008 from http://eps1.asu.edu/aepi/AEPI_2005_annual_report.htm
16. M. Cochran-Smith, Stayers, Leavers, Lovers, and Dreamers: Insights about teacher retention. *Journal of Teacher Education*, 55(5), 2004, 387-392.

Chapter 2. Opportunities and Challenges for Teaching

1. The authors would like to acknowledge Brendan Cantwell and Andrew Honoman for their help and support in producing this paper.
2. U.S. Census Bureau, Louisiana Loses Population; Arizona Edges Nevada as Fastest-Growing State. U.S. Census Bureau News. CB06-187. U.S. Department of Commerce. Washington, DC, 2006. Retrieved March 7, 2008 from <http://www.census.gov/Press-release/www/releases/archives/population/007910.html>; and U.S. Census Bureau, Population Division, Projections Branch, State Interim Population Projections by Age and Sex: 2004 – 2030. Table B1. The total population by selected age groups, 2007. Retrieved January 30, 2008 from: <http://www.census.gov/population/projections/SummaryTabB1.pdf>
3. U.S. Census Bureau, Population Division, Interim State Population Projections, 2005. Retrieved March 7, 2008 from <http://www.census.gov/population/projections/PressTab1.xls>
4. Arizona Department of Education. Research and Evaluation Section, 2006-2007 October Enrollment By County, Gender and Ethnicity, 2007, February. Retrieved January 12, 2008 from: <http://www.ade.az.gov/researchpolicy/AZENroll/2006-2007/OctEnroll2007countygenderethnicity.pdf>
5. Ibid.
6. U.S. Department of Education. Institute for Education Sciences. Common Core of Data, public school district for the 2005/6 school year. Washington, DC: National Center for Educational Statistics, 2007. Accessed on January 24, 2008 from: <http://nces.ed.gov/ccd/districtsearch/>.
7. Arizona Department of Education. Research and Evaluation Section, 2006-2007 October Enrollment By District, School, Gender and Ethnicity, 2007. Retrieved January 23, 2008 from: <http://www.ade.az.gov/researchpolicy/AZENroll/20062007/OctEnroll2007districtschoolgenderethnicity.pdf>

8. U.S. Department of Education. Institute for Education Sciences. Common Core of Data, public school district for the 2005/6 school year. Washington, DC: National Center for Educational Statistics, 2007. Accessed on January 24, 2008 from: <http://nces.ed.gov/ccd/districtsearch/>
9. Integrated Postsecondary Education Data System. (2007). College Navigator. Retrieved Jan. 17, 2008 from: <http://nces.ed.gov/collegenavigator/>
10. Arizona Department of Education. Research and Evaluation Section, 2006-2007 October Enrollment By District, School, Gender and Ethnicity, 2007. Retrieved January 23, 2008 from: <http://www.ade.az.gov/researchpolicy/AZEnroll/20062007/OctEnroll2007districtschoolgendeethnicity.pdf>; and U.S. Department of Education. Institute for Education Sciences. Common Core of Data, public school district for the 2005/6 school year. Washington, DC: National Center for Educational Statistics, 2007. Accessed on January 24, 2008 from: <http://nces.ed.gov/ccd/districtsearch/>
11. Arizona Department of Education. Assessments Section, NAEP 2007, Arizona: Reading and Mathematics Results, 2007. Retrieved January 12, 2008 from: <http://www.ade.az.gov/standards/naep/NAEP2007.pdf>
12. Arizona Minority Education Policy Analysis Center. Intercultural Development Research Association, Dropping Out of Arizona's Schools: the Scope, the Costs, and Successful Strategies to Address the Crisis, 2002. Retrieved on January 11, 2008 from: http://azhighered.org/content/AMEPAC_Study_Complete_online.pdf
13. U.S. Department of Education. Institute for Education Sciences, Dropout Rates in the United State: 2004. Selected Findings: Averaged Freshman Graduation Rates for Public School Students. Washington, DC: National Center for Educational Statistics, 2006. Retrieved January 13, 2008 from: <http://nces.ed.gov/pubs2007/dropout/FindingsAveragedFreshmanGraduation.asp>
14. Education Trust, Education Watch Arizona Key Education Facts and Figures: Achievement, Attainment and Opportunity From Elementary School through College. Washington, D.C., 2006. Retrieved January 29, 2006 from: <http://www2.edtrust.org/edtrust/summaries2006/Arizona.pdf>
15. Ibid.
16. Center for the Future of Arizona and Morrison Institute for Public Policy. Beat the Odds...Why Some Schools with Latino Children Beat the Odds and Others Don't, 2006. Accessed Jan 20, 2008 from: http://www.arizonafuture.org/latinoEd/FAZ502_LatinEd_final.pdf.
17. D'Agostino, J., & Kosorok, J. (2007). 2006 & 2007 MAC-Ro Initiative Evaluation. The University of Arizona. Tucson, AZ.
18. Integrated Postsecondary Education Data System. (2007). College Navigator. Retrieved Jan. 17, 2008 from: <http://nces.ed.gov/collegenavigator/>
19. U.S. Census Bureau, Population Division, Projections Branch, State Interim Population Projections by Age and Sex: 2004 – 2030. Table B1. The total population by selected age groups, 2007. Retrieved January 30, 2008 from: <http://www.census.gov/population/projections/SummaryTabB1.pdf>
20. E. L. Anderson, Changing U.S. demographics and American higher education. *New Directions for Higher Education*, 121, 2003, 3-12.

21. E. L. Anderson, Changing U.S. demographics and American higher education. *New Directions For Higher Education*, 121, 2003, 3-12.
22. Arizona Board of Regents. Executive Summary. June 3, 2004 meeting. Retrieved Jan 12, 2008 from:
http://www.abor.asu.edu/special_editions/redesign/SPBDMtg%20603exec%20sum%20reorg.pdf
23. U.S. Department of Education. Institute for Education Sciences, Projections of Education Statistics to 2016. Washington D.C. National Center for Education Statistics, 2006. Retrieved January 13, 2008 from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2008060>
24. Excelencia in Education, Arizona's human capital: Latino students and their families. Washington, DC, 2006. Retrieved January 20, 2008 from: [http://www.edexcelencia.org/pdf/AZ-ACHE FINAL.pdf](http://www.edexcelencia.org/pdf/AZ-ACHE_FINAL.pdf).
25. Arizona Board of Regents, A Redesigned Public University System, 2005. Retrieved January 13, 2008 from: http://www.abor.asu.edu/special_editions/redesign/redesign_index.htm
26. N. González, L. Moll, and C. Amanti, Funds of knowledge: Theorizing practices in households, communities, and classrooms. Mahwah, New Jersey: Lawrence Erlbaum, 2005.
27. U.S. Census Bureau, Census 2000 Demographic Profile Highlights: Selected Population Group: Hispanic or Latino (of any race). Summary File 2 and Summary File 4. Retrieved January 15, 2008 from: <http://www.factfinder.census.gov>.
28. Morrison Institute for Public Policy, How Arizona Compares; Real numbers and hot topics. Phoenix: Arizona State University, 2005. Retrieved Jan. 18, 2008 from: <http://asu.edu/copp/morrison/publications.htm>.
29. D. August and K. Hakuta, Improving Schooling for Language-Minority Children: A Research Agenda. Committee on Developing a Research Agenda on the Education of Limited-English-Proficient and Bilingual Students, Commission on Behavioral and Social Sciences and Education, National Research Council. Washington, D.C.: National Academy Press, 1997; and M. M. Meyer and S. E. Fienberg, Assessing Evaluations Studies: The Case of Bilingual Education Strategies. Panel to Review Evaluation Studies of Bilingual Education, Committee on National Statistics, National Research Council. Washington, D.C.: National Academy Press, 1992.
30. J. Greene, A Meta-Analysis of the Effectiveness of Bilingual Education. Tomas Rivera Policy Institute, in collaboration with University of Texas at Austin and Harvard University. Claremont, CA: Tomas Rivera Policy Institute, 1998. The document is included in briefing binder appendix.
31. U.S. Census Bureau, Census 2000 Demographic Profile Highlights: Selected Population Group: Hispanic or Latino (of any race). Summary File 2 and Summary File 4. Retrieved January 15, 2008 from: <http://www.factfinder.census.gov>.
32. National Center for Educational Statistics [NCES], Status and trends in the education of American Indians and Alaskan Natives. Washington, DC, 2005.
33. Institute for Higher Education Policy [IPEDS], The path of many journeys: the benefits of higher education for Native people and communities. Washington, DC, 2007.
34. National Center for Educational Statistics [NCES], Status and trends in the education of American Indians and Alaskan Natives. Washington, DC, 2005.
35. U.S. Census Bureau. State and County Quickfacts, 2008. Retrieved January 29, 2008 from: <http://quickfacts.census.gov/qfd/states/04000.html>

36. Arizona Department of Education. Research and Evaluation Section, 2006-2007 October Enrollment By County, Gender and Ethnicity, 2007, February. Retrieved January 12, 2008 from: <http://www.ade.az.gov/researchpolicy/AZENroll/2006-2007/OctEnroll2007countygenderethnicity.pdf>
37. Education Trust, Education Watch Arizona Key Education Facts and Figures: Achievement, Attainment and Opportunity From Elementary School through College. Washington, D.C., 2006. Retrieved January 29, 2006 from: <http://www2.edtrust.org/edtrust/summaries2006/Arizona.pdf>.
38. L. Moll, C. Amanti, D. Neff, and N. González, Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into Practice*, 31, 1992, 132-141.
39. N. González, L. Moll, and C. Amanti, Funds of knowledge: Theorizing practices in households, communities, and classrooms. Mahwah, New Jersey: Lawrence Erlbaum, 2005.
40. See, for example, E. H. Haskell, *Transfer of learning: Cognition, instruction, and reasoning*. New York: Academic Press, 2001.
41. Morrison Institute for Public Policy, *Five Shoes Waiting to Drop on Arizona's Future*. Arizona State University, Arizona Board of Regents, 2001. Retrieved January 14, 2008 from: <http://www.asu.edu/copp/morrison/APC01New.pdf>
42. L. Sujo de Montes, *The condition of technology in Arizona 2005*. Northern Arizona University, 2005. Retrieved January 29, 2008 from: http://eps1.asu.edu/aepi/AEPI_2005_annual_report.htm.
43. R. Valletta and G. MacDonald, *Is There a Digital Divide?* FRBSF Economic Letter, Number 2003-38, December 26, 2003. Economic Research, Federal Reserve Bank of San Francisco, CA: San Francisco. Retrieved January 31, 2008 from <http://www.frbsf.org/publications/economics/letter/2003/el2003-38.pdf>
44. D. Schnieder and D. Stevenson, *The ambitious generation: America's teenagers motivated by directionless*. New Haven, CT: Yale University Press, 1999; and A. Venezia, M. W. Kirst, and A. L. Antonio, *Betraying the college dream: how disconnected K-12 and postsecondary education systems undermine student aspirations*. Palo Alto, CA: The Bridge Project. Stanford University, 2003.
45. U.S. Department of Education, National Center for Education Statistics, *The Condition of Education 2004*. NCES 98-013. Washington, DC: Government Printing Office.
46. C. Adelman, *The Toolbox Revisited: Paths to Degree Completion From High School Through College*. U.S. Department of Education. Office of Educational Research and Improvement. Washington, DC, 2006.
47. L. Berkner and L. Chavez, L. *Access to postsecondary education for the 1992 high school graduates*. Postsecondary education descriptive analysis reports. Statistical analysis report (NCES 98-105). National Center For Education Statistics: Washington, DC, 1997.
48. Institute for Higher Education Policy [IPEDS], *The path of many journeys: the benefits of higher education for Native people and communities*. Washington, DC, 2007.
49. K. Haycock and S. Huang, *Are Today's High School Graduates Ready? Thinking K-16*, 2001. Washington, DC: Education Trust Winter.
50. C. Adelman, *The Toolbox Revisited: Paths to Degree Completion From High School Through College*. U.S. Department of Education. Office of Educational Research and Improvement. Washington, DC, 2006.

51. J. E. Rosenbaum, R. Deil-Amen, and A. Person, *After Admission: From College Access to College Success*. New York, New York: Russell Sage Foundation, 2006.
52. J. Reynolds, M. Stewart, R. MacDonald, and L. Sischo, *Have Adolescents Become Too Ambitious?: High School Seniors' Educational and Occupational Plans, 1976 to 2000*. *Social Problems*, 53, 2006, 186–206.
53. *Ibid.*
54. S. A. Bohon, H. Macpherson, and J. H. Atilas, J. H. (2005). Educational Barriers for New Latinos in Georgia. *Journal of Latinos and Education* 4, 2005, 43–58.
55. J. E. Rosenbaum, R. Deil-Amen, and A. Person, *After Admission: From College Access to College Success*. New York, New York: Russell Sage Foundation, 2006.
56. National Center for Public Policy and Higher Education [NCPPE], *Measuring Up: The National Report Card on Higher Education, 2004*. Retrieved January 29, 2008 from: <http://measuringup.highereducation.org/>
57. C. Adelman, *The Toolbox Revisited: Paths to Degree Completion From High School Through College*. U.S. Department of Education. Office of Educational Research and Improvement. Washington, DC, 2006.
58. Arizona Board of Regents, *Arizona High School Eligibility Study, 2006*. Retrieved January 28, 2008 from: http://www.abor.asu.edu/1_the_regents/meetings/board_book/Sep-2007/Item-18-2007-09-.pdf
59. Arizona Community College Association, *A Report on Academic Performance of High School Graduates*. Tempe, AZ: Arizona Community College Association, 2006.
60. R. D. Stanton-Salazar, *Manufacturing hope and despair: The school and kin support networks of U.S.-Mexican youth*. New York: Teachers College Press, 2001.
61. J. H. Vargas, *College knowledge: addressing information barriers to college*. Boston: The Education Resources Institute (TERI), 2004. Retrieved on March 5, 2008 from www.teri.org; and A. Venezia, M. W. Kirst, and A. L. Antonio, *Betraying the college dream: how disconnected K-12 and postsecondary education systems undermine student aspirations*. Palo Alto, CA: The Bridge Project. Stanford University, 2003.
62. Society for Human Resource Management, *Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century Workforce*. The Conference Board, *Corporate Voices for Working Families, Partnership for 21st Century Skills*, 2008. Retrieved on January 19, 2008 from: http://www.21stcenturyskills.org/documents/FINAL_REPORT_PDF09-29-06.pdf
63. National Center for Higher Education Management Systems [NCHEMS], *Unmet Needs for Baccalaureate Education in Pima County, 2006*. Retrieved January 11, 2008 from: <http://www.pima.edu/announcements/200612/documents/NCHEMS-report.pdf>
64. U.S. Department of Education, *Income of U.S. Workforce Projected to Decline If Education Doesn't Improve*. (The Secretary of Education's Commission on the Future of Higher Education, Issue Paper No. 9). Washington DC: U.S. Department of Education, 2006. Retrieved January 18, 2008 from: <http://www.ed.gov/about/bdscomm/list/hiedfuture/reports.html>.
65. *Excelencia in Education, Arizona's human capital: Latino students and their families*. Washington, DC, 2006. Retrieved January 20, 2008 from: http://www.edexcelencia.org/pdf/AZ-ACHE_FINAL.pdf.

66. Morrison Institute for Public Policy. How Arizona Compares; Real numbers and hot topics. Phoenix: Arizona State University, 2005, p. 32. Retrieved Jan. 18, 2008 from: <http://asu.edu/copp/morrison/publications.htm>.
67. Ibid, p. 34-35.
68. Ibid, p. 26.
69. M. L. Stevens, An Admissions race that's already won. *The Chronicle of Higher Education*, LIV, 2008, 18. Retrieved on January 11, 2008 from: <http://chronicle.com/commentary>.

Chapter 3. Ensuring Teaching Quantity and Quality: State and Federal Policy for Teaching

1. Diane Ravitch, Ph.D., *A Brief History of Teacher Professionalism*. White House Conference on Preparing Tomorrow's Teachers, August, 2003
2. Early Childhood certificates are discussed in Chapter 5 and Secondary certificates in Chapter 6.
3. Arizona State Board of Education rule language, R7-2-613
4. Alternative Teacher Development Program, Arizona Revised Statutes, 15-552
5. Arizona State Board of Education Rules and Regulations R7-2-604 through R7-2-604.02
6. Council for Higher Education Accreditation, www.chea.org, 2008
7. "Quality Counts," *Education Week*, vol. 27, number 18, January 10, 2008
8. State policy and statutes from South Carolina, Virginia, Georgia, Florida, California, Illinois, New Mexico, Ohio, Minnesota, Colorado, and Texas.
9. Interview with Patricia Hardy, ADE
10. *Its About Time*, National Foundation for Improvement in Education, 2002
11. Arizona Teacher Working Conditions Survey, 2006 and 2007, www.aztwc.org
12. *Human Resources a Weak Spot*, Quality Counts, January 10, 2008, retrieved from www.edweek.org
13. *Tapping the Potential: Retaining and Developing High Quality New Teachers*, Executive Summary, p.1, Alliance for Excellent Education, 2004
14. Richard Ingersoll, *Is There Really a Teacher Shortage*, Alliance for Excellent Education, 2003.
15. *Mentoring New Teachers to Increase Retention*, Research Brief, New Teacher Center at University of California, Santa Cruz, Dec. 2005
16. *High Quality Mentoring and Induction Practices*, New Teacher Center Reflections, UC Santa Cruz, Winter 2008
17. *The Costs and Benefits of a Comprehensive Induction Program*, Research Brief, New Teacher Center at University of California, Santa Cruz, June, 2007.
18. *Final Report, Arizona Working Conditions Survey 2007*, Center for Teaching Quality
19. Dowling, *AZTEP Final Evaluation Report*, 2007, submitted to the Arizona Governor's Office
20. *Strengthening Teacher Quality and Support: Next Steps for Arizona*, Governor's Committee for Teacher Quality and Support, October 2007

21. Arizona Teacher Working Conditions Survey, 2007
22. AZ K-12 Center Focus Group Report, 2006 and 2007
23. Arizona Revised Statutes 15-537, Performance of certified teachers; evaluation systems.
24. Charlotte Danielson and Thomas L. McGreal, *Teacher Evaluation to Enhance Professional Practice*, (2000)
25. Jana Echevarria and Deborah Short, *The Sheltered Instruction Observation Protocol*, 2001
26. Bob Marzano, *The Art and Science of Teaching*, July 2007
27. *Why Some Schools with Latino Children Beat the Odds and Others Don't*, Morrison Institute for Public Policy (2006)
28. Arizona Revised Statutes 15-532 and 15-533
29. Connecticut Beginning Educator Support and Training (BEST) Program
www.sde.ct.gov/sde/cwp/view.asp?a=2607&Q=319186
30. California Beginning Teacher Support and Assessment (BTSA) Program, www.btsa.ca.gov
31. Georgia Master Teacher Certification Program,
<http://www.georgiamasterteachers.org/MasterTeacher.aspx>
32. Georgia Professional Standards Commission, Rick Eiserman, Director of Communication
33. West Virginia Teach 21 Website, <http://wvde.state.wv.us/index.html>
34. *Quality Teacher Preparation Programs Pre K-12*, Teacher Education Partnership Commission, 2005
35. US Bureau of the Census, (1998)

Chapter 4. The Costs of Teaching

1. Arizona School Boards Association, Arizona school finance. 2008. Retrieved from <http://www.azsba.org/aboutaz.htm>.
2. P. Kossan, and O. Madrid, Schools stunned by voter rejection. *Arizona Republic*, November 8, 2007. Retrieved February 3, 2008 from <http://www.azcentral.com/arizonarepublic/news/articles/1108overrides1108.html>.
3. Arizona State Senate Research Staff, *School desegregation in Arizona*. Phoenix: Arizona, State Senate Issue Brief, September 13, 2007.
4. State of Arizona School Facilities Board, Students first overview. 2007. Retrieved from <http://www.azsfb.gov/sfb/sfbweb/sfbaays/home.asp>.
5. Arizona Business and Education Coalition, *2004 Principles of agreement: Arizona's General Fund Budget*. Retrieved from <http://www.azbec.org/policy2004.cfm>
6. Center on Reinventing Public Education, *School Finance Redesign Project: a Synthesis of Work to Date*. Daniel J. Evans School of Public Affairs: University of Washington, 2008.
7. VAULT, *Salary wizard*. Retrieved January 10, 2008 from http://vault.salary.com/salarywizard/laoutscripts/swzl_compresult.as.
8. Arizona State Retirement System, Contribution rates. Retrieved February 3, 2008 from http://www.azasrs.gov/web/pdf/Fact_Sheets/Contribution_Rates.pdf.

9. Morrison Institute, *Proposition 301: Promises, progress and prospects*. Arizona State University: Morrison Institute, 2002. Retrieved from <http://www.asu.edu/copp/morrison/> on January 13, 2008.
10. *Teacher Education Partnership Commission, The quality teacher crisis: Arizona's response, 2007*. www.teacherpartner.com.
11. J. Dowling, et. al. *The effects of the career ladder program on student achievement*. Report to the Arizona Department of Education, January 15, 2007.
12. *Arizona Republic, District, lawmaker want to expand incentives for Arizona Teachers*. *Arizona Republic*, December 17, 2007.
13. A. Odden and M. Wallace, *How to achieve world class teacher compensation*. *FreeLoad Press*, 2008.
14. *Arizona Education Association, Financial recognition in Arizona schools of national board certification, 2005*.
15. A. Odden and M. Wallace, *How to achieve world class teacher compensation*. *FreeLoad Press*, 2008.
16. *RODEL Foundation, Lead with five: five investments to improve Arizona public education, 2005*. Retrieved from http://www.rodelfoundationaz.org/Common/Files/Lead_with_Five.pdf.
17. *Thomson/South-Western (2007). Business performance incentives. 2007*. Retrieved January 13, 2008 from www.ag.ohio-state.edu/~ati-bus/HRM%20SB14eChap10.ppt.
18. A. Odden and M. Wallace, *How to achieve world class teacher compensation*. *FreeLoad Press*, 2008.
19. United States Department of Education, *Teacher incentive fund, 2007*. Retrieved from <http://www.ed.gov/programs/teacherincentive/index.html> on January 15, 2008.
20. E. Hanushek, *The economics of schooling: Production and efficiency in public school*. *Journal of Economic Literature*, 24, 1986, 1141-1177.
21. A. T. Milanowski, *The relationship between teacher performance evaluation scores and student achievement: evidence from Cincinnati*. *Peabody Journal of Education*, 79(4), 2004, 33-53.
22. J. Schacter and Y.M. Thum, *Paying for high and low quality teaching*. *Economics of Education Review*, 23, 2004, 411-430.
23. Center for Educator Compensation Reform (CECR)

Chapter 5. Early Childhood Education and Care in Arizona

1. Rolnick, A.J. & Grunewald, R. (2007). "Early Intervention on a Large Scale," in *From cradle to career: Connecting education from birth through adulthood*. <http://www.edweek.org/go/qc07>.
2. Calman, L.J. & Tarr-Whelan, L. (2005). *Early childhood education for all: A wise investment*. New York: Legal Momentum.
3. Kirp, D.L. (2007). *The sandbox investment*. Cambridge, MA: Harvard University Press.
4. Kids Count. (2005) <http://www.kidscount.org/datacenter/profile>
5. Children in Arizona (2005). <http://www.childrensdefense.org/statedata>
6. Children in Arizona (2005). <http://www.childrensdefense.org/state/data>

7. Bowman, B., Donovan, M.S., and Burns, M. S. (2000). *Eager to learn: Educating our preschoolers*. Washington, DC: National Academy Press.
8. Carson, B.S. (1999). "Early brain development." In J. Nevin (Ed.) *The Dana brain science guide*. New York: The Dana Press.
9. Committee for Economic Development. (2002). *Preschool for all: Investing in a productive and just society. A statement by the Research Committee for Economic Development*. New York: New York: Committee for Economic Development.
10. Gopnik, A., Meltzoff, A.N., & Kuhl, P.K. (1999). *The scientist in the crib: Minds, brains, and how children learn*. New York: William Morrow and Company.
11. Risley, T. & Hart, B. (1995). *Meaningful differences in the everyday experience of young children*. Baltimore: Paul H. Brookes Publishing Co.
12. Bowman, B., Donovan, M.S., & Burns, M.S.(Eds.). (2000). *Eager to learn: Educating our preschoolers- Executive Summary*. Washington, DC: National Academy Press.
13. Whitehurst, G.J. Remarks made at the White House Conference on Preschool Cognitive Development, Georgetown University, July 26, 2001.
14. National Association of Child Advocates. (December 2000). *Making investments in young children: What the research tells us*. Washington, DC: National Association of Child Advocates.
15. Bowman, B., Donovan, M.S., and Burns, M. S. (2000). *Eager to learn: Educating our preschoolers*. Washington, DC: National Academy Press.
16. Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M.L., Howes, C., Kagan, S. L., Yazejian, N., Byler, P., Rustici, J., & Zelazo, J. (1999). *The children of the cost, quality, and outcomes study go to school: Executive summary*. Chapel Hill: University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Center.
17. Arizona Early Childhood Development and Health Board. (2007). *Building bright futures: 2007 statewide needs and assets assessment*. Phoenix: Arizona Early Childhood Development and Health Board.
18. O'Hare, W. & Mather, M. (Revised October 2003). *A Kids Count Population Reference Bureau Report on Census 2000: The growing number of kids in severely distressed neighborhoods – Evidence from the 2000 Census*. Baltimore: The Annie E. Casey Foundation and the Population Reference Bureau.
19. National Resource Center for Health and Safety in Child Care and Early Education. (Nov. 14, 2007). <http://nrc.uchsc.edu/STATES/AZ/Arizona.htm>.
20. Arizona Department of Education. (January 2008). Teacher certification and endorsement. <http://www.ade.az.gov/earlychildhood/TeacherCE/>
21. Kelley, M.F., Tobin, J., & Ortiz, K. (2005). *The condition of early childhood education and care in Arizona: 2005*. Tempe, AZ: Arizona State University.
22. Arizona Department of Education. February 1, 2008. Conversation with staff.
23. Barnett, W.S., Hustedt, J.T., Hawkinson, L.E., & Robin, K.B. (2006). *2006 State preschool yearbook*. www.nieer.org.

Chapter 6. The Preparation and Support of Mathematics and Science Teachers for Arizona

1. R. Henke, L. Zahn, and C. Carroll, *Attrition of new teachers among recent college graduates: Comparing occupational stability among 1992–1993 college graduates who taught and those who worked in other occupations*. Washington, DC: National Center for Education Statistics, 2001.
2. L. Darling-Hammond, Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1), 2000: <http://epaa.asu.edu/epaa/v8n1>; and S. Wilson, L. Darling-Hammond, and B. Berry *A case of successful teaching policy: Connecticut's long-term efforts to improve teaching and learning*. Seattle, WA: Center for the Study of Teaching and Policy, 2000.
3. H. Lankford, S. Loeb, and J. Wyckoff, (2002). Teacher sorting and the plight of urban schools: descriptive analysis. *Educational Evaluation and Policy Analysis*, 24(1), 2000, 37- 62.
4. L. Darling-Hammond, Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1), 2000: <http://epaa.asu.edu/epaa/v8n1>.
5. Morrison Institute for Public Policy, *Is There a Teacher Shortage? Demand and Supply in Arizona*. Tempe, AZ: Arizona State University, 2003.
6. Morrison Institute for Public Policy, *Is There a Teacher Shortage? Demand and Supply in Arizona*. Tempe, AZ: Arizona State University, 2003.
7. (Sanders & Rivers, 1996)
8. L. Darling-Hammond and G. Sykes, Wanted: A national teacher supply policy for education: The right way to meet the "Highly Qualified Teacher" challenge?
9. *Education Policy Analysis Archives*, 11(33), 2003. [Online serial], Available: <http://epaa.asu.edu/epaa/v11n33/v11n33.pdf>.
10. C. Guarino, L. Santabanez, and G. A. Daley, G. A. Teacher recruitment and retention: A review of the recent literature. *Review of Educational Research*, 76(2), 2006, 173-208.
11. J. A. Luft and N. C. Patterson, Bridging the gap: Supporting beginning science teachers. *Journal of Science Teacher Education*, 13(4), 2002, 287-313; and J. A. Luft, G. H. Roehrig, and N. C. Patterson, N.C. (2003). Contrasting landscapes: A comparison of the impact of different induction programs on beginning secondary science teachers' practices, beliefs, and experiences. *Journal of Research in Science Teaching*, 40(1), 2003, 77-97.
12. Arizona Community Foundation, *Educating Arizona: Assessing our Education System (Birth – Grade 12)*. Phoenix, AZ: Arizona Community Foundation, 2008.
13. C. Guarino, L. Santabanez, and G. A. Daley, G. A. Teacher recruitment and retention: A review of the recent literature. *Review of Educational Research*, 76(2), 2006, 173-208.
14. L. Ma, *Knowing and Teaching Mathematics: Teachers' Understanding of Fundamental Mathematics in the United States and China*. Mahwah, NJ: Lawrence Erlbaum Associates, 1999.
15. L. Darling-Hammond and G. Sykes, Wanted: A national teacher supply policy for education: The right way to meet the "Highly Qualified Teacher" challenge? *Education Policy Analysis Archives*, 11(33), 2003. [Online serial], Available: <http://epaa.asu.edu/epaa/v11n33/v11n33.pdf>.
16. Arizona Community Foundation, *Educating Arizona: Assessing our Education System (Birth – Grade 12)*. Phoenix, AZ: Arizona Community Foundation, 2008.

17. J. Eccles, S. Lord, and C. Midgley, What Are We Doing to Early Adolescents? The Impacts of Educational Contexts on Early Adolescents. *American Educational Research Journal*, August, 1991, 521-542.
18. D. R. Clasen, J. A. Middleton, and T. J. Connell, T. J. Assessing artistic and problem-solving performance in minority and nonminority students using a nontraditional multidimensional approach. *The Gifted Child Quarterly*, 38(1), 1994, 27-32.
19. National Academy of Sciences, *National Science Education Standards*. Washington, DC: National Academies Press, 1995; and National Council of Teachers of Mathematics, *Professional Standards for Teaching Mathematics*. Reston, VA: National Council of Teachers of Mathematics, 1994.
20. L. S. Shulman, Those who understand: Knowledge growth in teaching. In B. Moon & S. S. Mayes (Eds.), *Teaching and Learning in the Secondary School*. (pp. 125-133). New York: Routledge, 1987.
21. Governor's Council on Innovation and Technology, Education Subcommittee. (*Governor's Council on Innovation and Technology: Education Subcommittee Report*. Phoenix, AZ: Office of the Governor, 2006.
22. T. Kurz, J. A. Middleton, and H. Yanik, H. A taxonomy of software for mathematics instruction. *Journal for Contemporary Issues in Technology and Teacher Education*, 5(2), 2005. [Online serial], Available: <http://www.citejournal.org/vol5/iss2/mathematics/article1.cfm>
23. Teachers for a New Era, *Teachers for a New Era: A National Imperative to Improve the Quality of Teaching*. New York: Carnegie Corporation, 2001. Article available online: <http://www.teachersforanewera.org/index.cfm?fuseaction=home.prospectus>.
24. Morrison Institute for Public Policy, *Beat the Odds: Why Some Schools with Latino Children Beat the Odds and Others Don't*. Tempe, AZ: Arizona State University, 2006.

Chapter 7. Leadership for Teaching

1. D. Connor, Leading from the Future. In C. J. Schwahn and W. G. Spady (Eds.), *Total Leaders: Applying the Best Future-Focused Change Strategies to Education*. Arlington, VA: American Association of School Administrators, 1998.
2. E. Camborn, B. Rowan, and J. Taylor, *Distributed Leadership in Schools: The Case of Elementary Schools Adopting Comprehensive School Reform Models*. Ann Arbor: University of Michigan, Consortium for Policy Research in Education, 2003.
3. Darling-Hammond, L., LaPointe, M., Meyerson, D., Orr, M. T., & Cohen, C., *Preparing School Leaders for a Changing World: Lessons from Exemplary Leadership Development Programs*. Stanford, CA: Stanford University, Stanford Educational Leadership Institute, 2007.

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